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L E T T E R S
CONCERNING THE
NORTHERN COAST
OF THE
COUNTY OF ANTRIM.

CONTAINING SUCH
C I R C U M S T A N C E S
AS APPEAR WORTHY OF NOTICE RESPECTING THE
ANTIQUITIES, MANNERS AND CUSTOMS
OF THAT COUNTRY.

TOGETHER WITH
THE NATURAL HISTORY OF THE BASALTES,
AND ITS ATTENDANT FOSSILS,
IN THE NORTHERN COUNTIES OF IRELAND.

THE WHOLE ILLUSTRATED BY
AN ACCURATE MAP,
AND ENGRAVINGS OF THE MOST INTERESTING
OBJECTS ON THE COAST.

IN TWO PARTS.

By THE REV. WILLIAM HAMILTON,
B. D. and M. R. I. A.

In these LETTERS is stated a plain and impartial VIEW of the
VOLCANIC THEORY of the BASALTES.

D U B L I N :

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M.DCC.XC.

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TO THE
RIGHT HONOURABLE
JAMES, EARL OF CHARLEMONT,
PRESIDENT OF THE ROYAL IRISH ACADEMY,
&c. &c.
THE DISINTERESTED PATRON OF
EVERY INSTITUTION, FROM
WHICH HIS COUNTRY
CAN HOPE TO DERIVE
EITHER ADVANTAGE
OR ORNAMENT,

THESE LETTERS ARE INSCRIBED,

By his Lordship's most faithful,
And obedient Servant,

William Hamilton.



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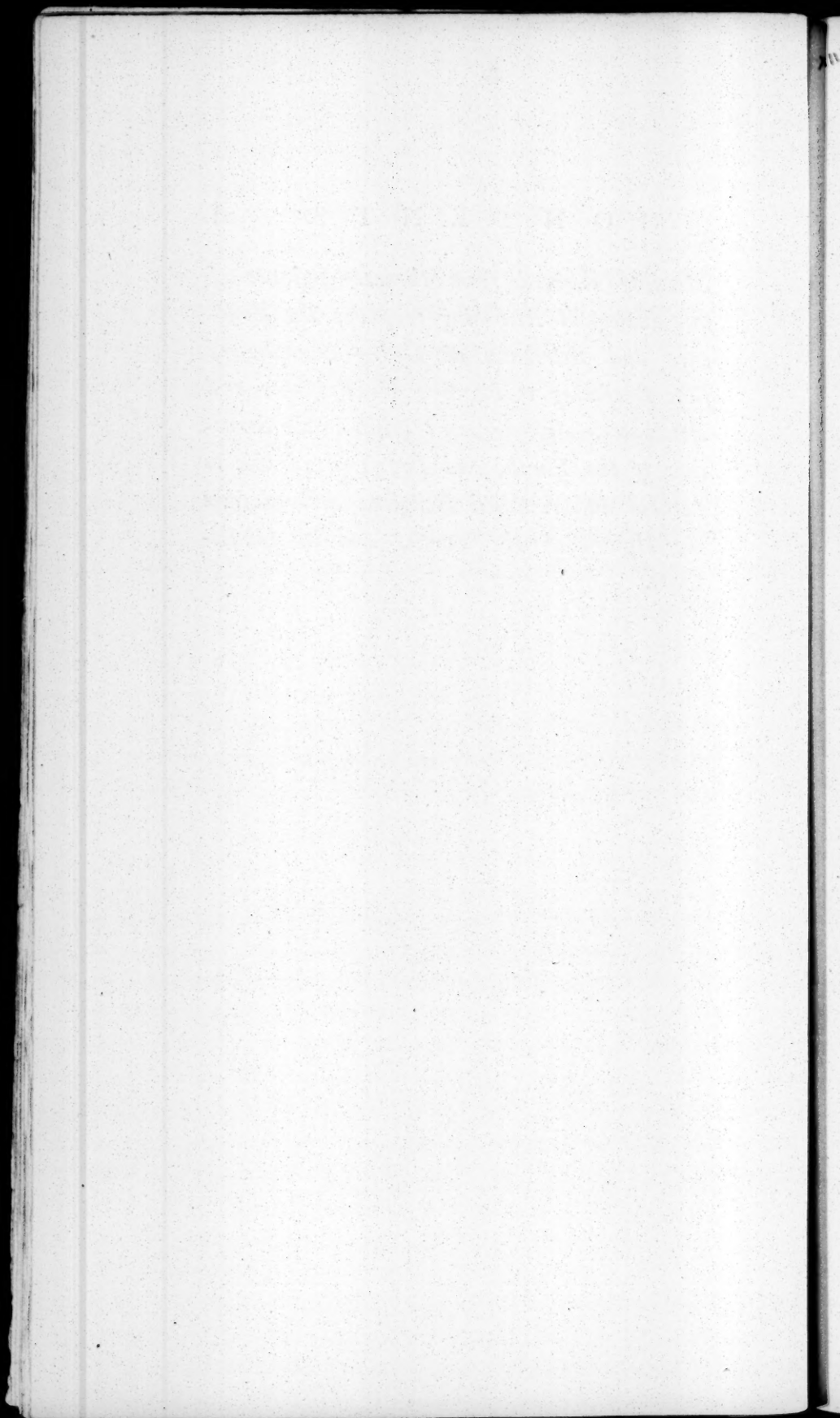
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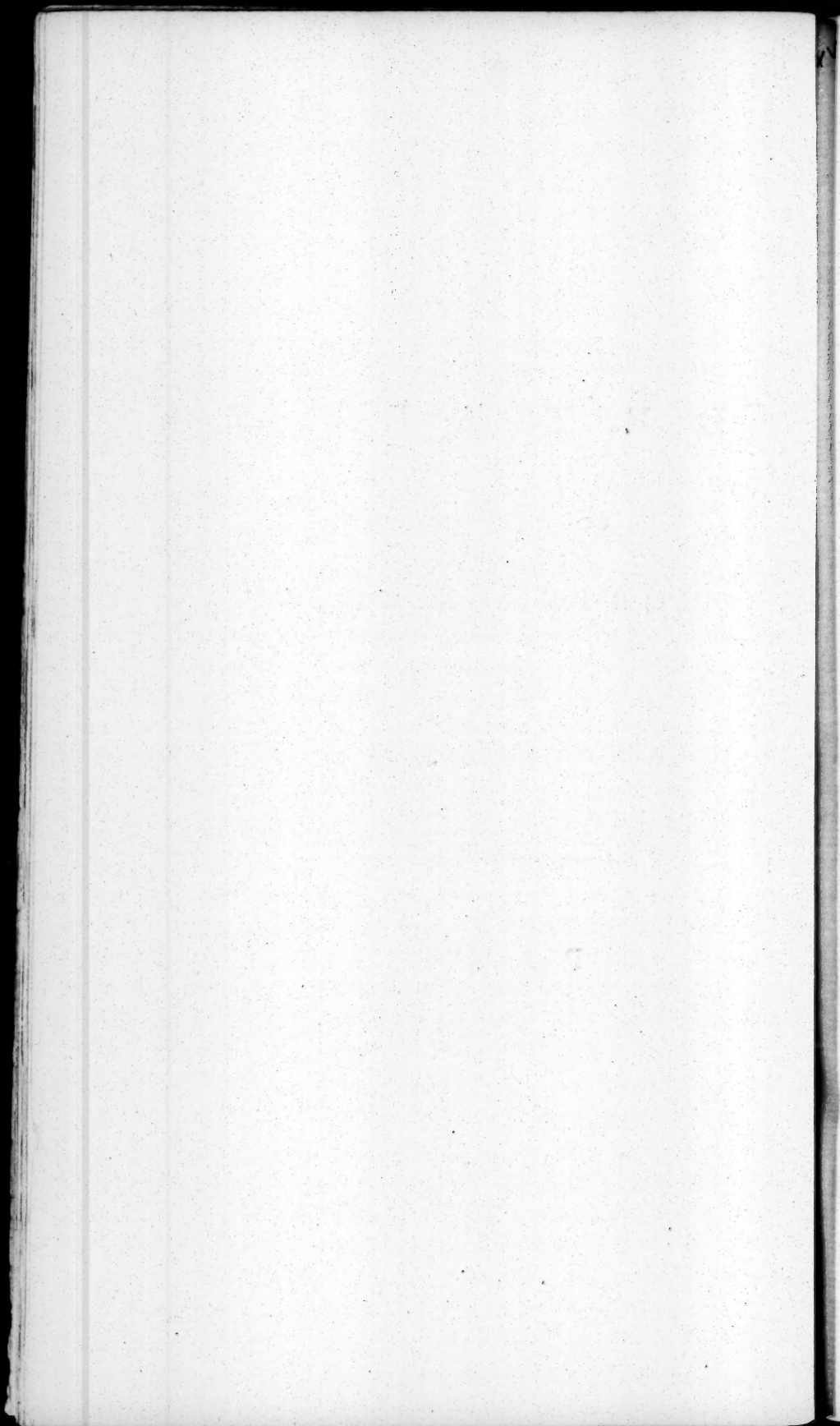
CONCERNING THE

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O F T H E

C O U N T Y O F A N T R I M , I N I R E L A N D .

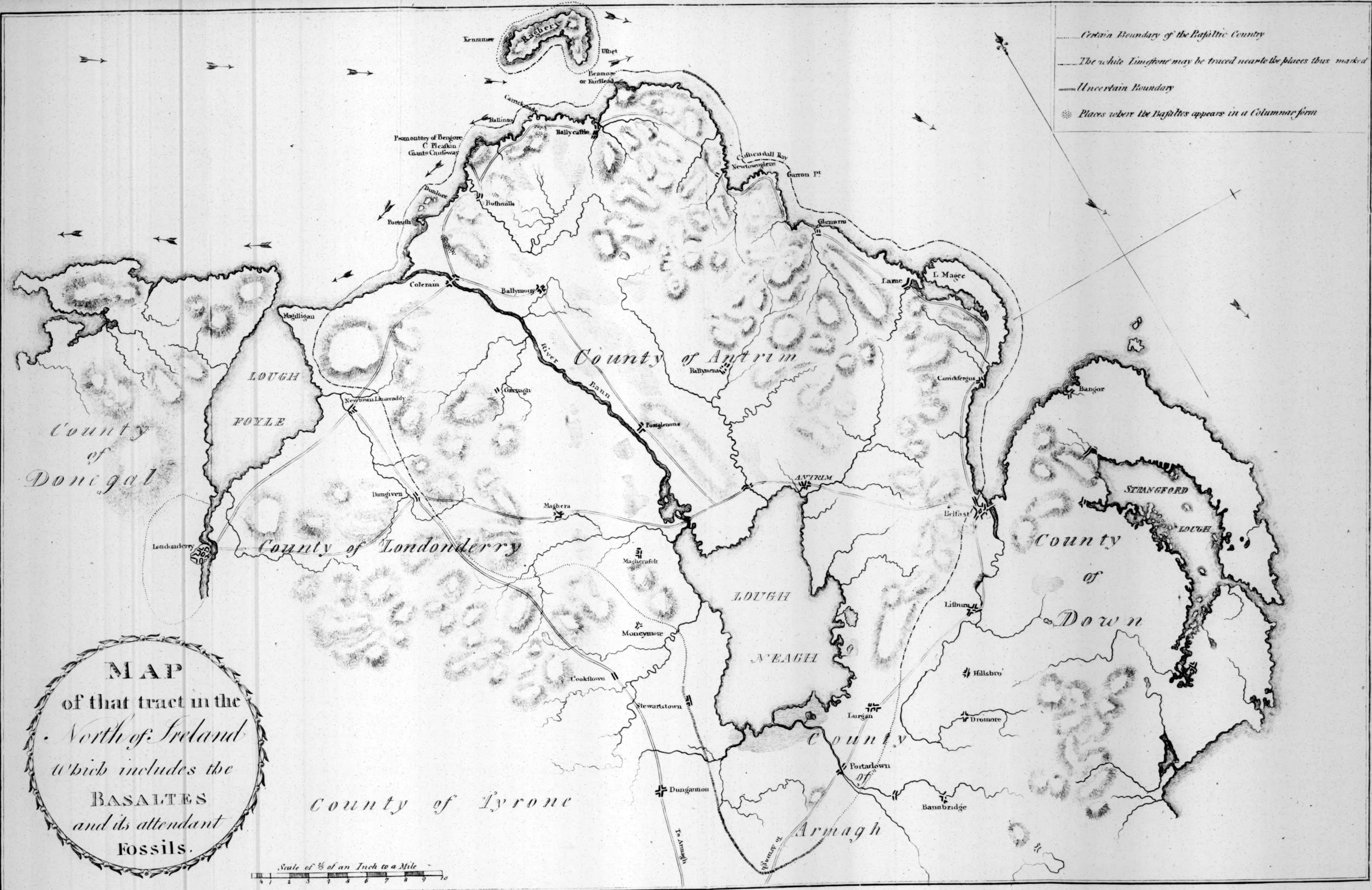
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*PART the First, containing an Account
of the Manners, Customs, Antiquities, &c.
of the Northern Coast of Antrim: And,
casually, Observations relating to its Natural
History.*

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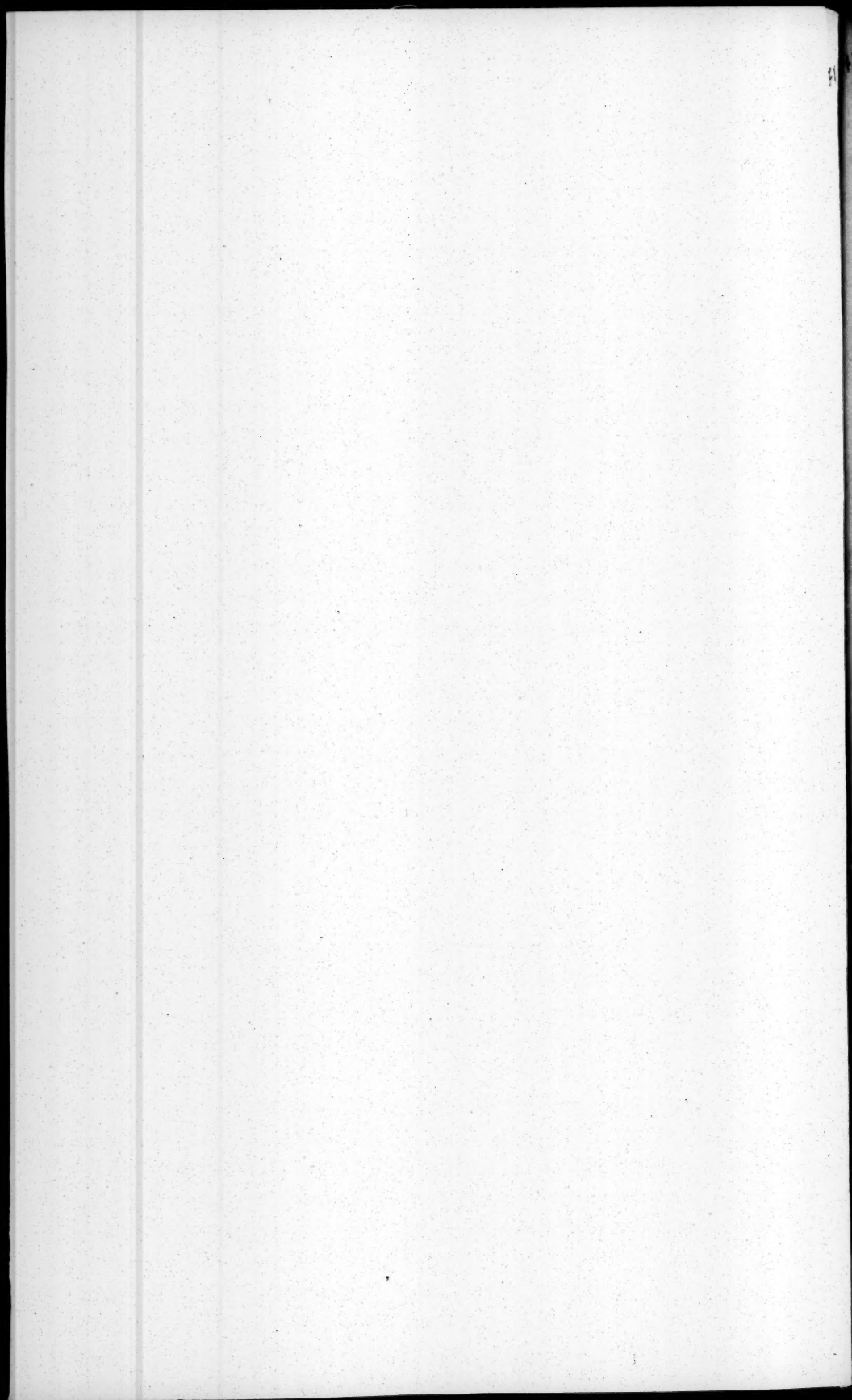




MAP
of that tract in the
North of Ireland
which includes the
BASALTES
and its attendant
Fossils.

Certain Boundary of the Basaltic Country
The white Limestone may be traced near to the places thus marked
Uncertain Boundary
Places where the Basaltic appears in a Columnar form

Scale of 1/2 of an Inch to a Mile



[1]

L E T T E R S
CONCERNING THE
N O R T H E R N C O A S T
O F T H E
C O U N T Y O F A N T R I M , I N I R E L A N D .

L E T T E R I .

Portrush, July 20, 1784.

DEAR SIR,

MY natural curiosity, and the wish I had to trace the whole extent of the basaltic of this country, induced me to make a short voyage, some days ago, to the island of Raghery*, which lies six or seven miles off

* The name of this island has suffered so many variations in its orthography, as renders it now very difficult to determine what may be the most proper. It is called

A

Ricnia,

2 LETTERS CONCERNING THE

off the north coast of Antrim, opposite to Ballycastle bay.

I ENJOYED a good deal of pleasure in examining that little spot, which to me was almost a new kingdom; and if an account of it can at all contribute to amuse an idle hour of your's, I shall more than double my own gratification.

THOUGH the island be not very remote, yet its situation, so much exposed to the
northern

Ricnia, by Pliny; *Ricina*, by Ptolemy; *Riduna*, by Antonius; *Recarn*, and *Recrain*, by the Irish historians; *Rac-linda*, by Buchannon the Scotch historian; *Ragblin*, by Sir James Ware; *Rathlin*, by most of the modern map-makers; and *Rachri*, by M. M'Kenzie, who professes to accommodate his English spelling, as near as possible, to the Irish pronunciation of each name.

Ragbery, as pronounced in *Ireland*, corresponds exactly with the spelling and sound of the name in use at this day. If one were inclined to speculate in the dangerous field of etymology, perhaps *Ragh-Erin*, or the *Fort of Erin*, might appear to be somewhat in the midst of these various sounds: And the command of the Irish coast, which must have attended the possessors of this island, in early ages, might make it not unaptly be stiled the Fortress of Ireland.

northern ocean, and the turbulence of its irregular tides, have thrown such difficulties in the way of landmen, that few have visited it but from necessity; and some curious arrangements of the columnar basalt, with which it abounds, have never been noticed, except by the inhabitants.

THE chalky cliffs of Raghery, crowned by a venerable covering of brown rock, form a very beautiful and picturesque appearance as one sails toward them; and if the turbulence of the sea do not restrain the eyes and fancy from expatiating around, such a striking similitude appears between this and the opposite coast, as readily suggests an idea that the island might once have formed a part of the adjoining country, from whence it has been disunited by some violent shock of nature.

You, to whom demonstration is familiar, will naturally wonder to see two shores, seven or eight miles asunder, so expeditiously connected by such a slender and fanciful middle

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term as apparent similitude; and yet the likeness is so strong, and attended with such peculiar circumstances, that I do not entirely despair of prevailing, even on you, to acknowledge my opinion as a probable one.

It does not appear unreasonable to conclude, that, if two pieces of land, separated from each other by a chasm, be composed of the same kind of materials, similarly arranged at equal elevations, these different lands might have been originally connected, and the chasm be only accidental.—For let us conceive the materials to be deposited by any of the elements of fire, air, earth, or water, or by any cause whatever, and it is not likely that this cause, otherwise general, should in all its operations regularly stop short at the chasm.—Now, the materials of which the island of Raghery is composed, are accurately the same as those of the opposite shore, and the arrangement answers so closely, as almost to demonstrate at first view their former union. But to explain this more clearly, it will be
necessary

necessary to give you a general sketch of this whole line of coast.

THE northern coast of Antrim seems to have been, originally, a compact body of limestone rock, considerably higher than the present level of the sea *; over which, at some later period, extensive bodies of vitrifiable stone have been superinduced, in a state of softness. The original calcareous stratum appears to be very much deranged and interrupted by these incumbent masses: In some places it is depressed greatly below its ancient level—After a short space one may see it borne down to the water's edge, and can trace it under the surface of the sea. By and by it dips entirely, and seems irretrievably lost under the superior mass—Again, however, after a temporary depression, it emerges, and with a similar variation recovers its original height.

IN

* In many places the white limestone appears elevated near 400 feet above the sea, but no extensive stratum, of a substance decidedly different, ever becomes visible beneath it.

6 LETTERS CONCERNING THE

IN this manner, and with such repeated vicissitudes of elevation and depression, it pursues a course of fifty miles along this northern coast, from the Lough of Carrickfergus on the East, to Lough Foyle on the West*.

It naturally becomes an object of curiosity, to enquire what the substance is, from which the limestone seems thus to have shrunk, burying itself (as it were in terror) under the
the

* The *southern* boundary of the chalky limestone, (which is peculiar to this part of Ireland) may be traced, at intervals, through a space of about 70 miles within the country; from the *White Head* on Carrickfergus bay, until the circuit is completed under the precipice called Solomon's Porch, at the entrance of Lough Foyle.

The neighbourhood of *Belfast*, in the county of Antrim; of *Moir*, in Down; of *Stewartstown*, and *Coagh*, in Tyrone; and of *Moncymore*, *Dungiven*, and *Newtown Limavady*, in Derry; will afford instances, whereby its course may be traced with tolerable accuracy.

Within this large circuit, of 120 miles, few substances occur, except, either the columnar or unformed basalt, and the fossils usually connected with them: without the circuit, however, fossils of a new and different character soon make their appearance through every part of the country.

the covering of the ocean. And on examination it appears to be the columnar basalt, under which the limestone stratum is very rarely found; nor indeed does it ever approach near to it without evident signs of derangement.

THUS, for example: The chalky cliffs may be discovered a little eastward from Portrush; after a short course, they are suddenly depressed to the water's edge under Dunluce Castle, and soon after lost entirely, in passing near the basalt hill of Dunluce, whose craigs, at a little distance from the sea, are all columnar. At the river Bush the limestone reappears, and skims for a moment along the level of the sea, but immediately vanishes on approaching toward the great promontory of Bengore, which abounds, in every part, with pillars of basalt; under this it is completely lost for the space of more than three miles.

EASTWARD from thence, beyond Dunfeverick Castle, it again emerges, and rising to a considerable

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considerable height, forms a beautiful barrier to White Park bay and the Ballintoy shore. After this, it suffers a temporary depression near the basalt hill of Knockfoghy, and then ranges along the coast as far as Ballycastle bay.

FAIRHEAD, towering magnificently with its massive columns of basalt, again exterminates it; and once more it rises to the eastward, pursuing its devious course, and forming, on the Glenarm shores, a line of coast the most fantastically beautiful that can be imagined*.

IF

* It is here stated, that, the limestone stratum is very rarely found immediately under the columnar basalt, as if the cause which generated the one, were hostile to the existence of the other, (of which somewhat more will be said hereafter). This assertion may be taken as pretty generally true, but it must not be understood, that, the limestone never disappears, except under these circumstances; for there are many instances in the circuit, where it ceases to be visible, although no columnar basalt be found over it, unless, perhaps, in such cases the pillars may lie deep under the ground, and therefore escape discovery.

IF this tedious expedition have not entirely worn out your patience, let us now take a view of the coast of Raghery itself, from the lofty summit of Fairhead, which overlooks it. Westward, we see its white cliffs rising abruptly from the ocean, corresponding accurately in materials and elevation with those of the opposite shore, and like them, crowned with a venerable load of the same vitrifiable rock. Eastward, we behold them dip to the level of the sea, and soon give place to many beautiful arrangements of basalt pillars, which form the eastern end of the island, and lie opposite to the basaltes of Fairhead; affording, in every part, a reasonable presumption that the two coasts were formerly connected, and that each was created, and deranged, by the same causes extensively operating over both.

BUT it is not in these larger features alone that the similitude may be traced; the more minute, and apparently particular circumstances, serve equally well to ascertain it.

THUS,

THUS, an heterogeneous mass of sandstone, coals, iron ore, &c. the substances which form the eastern side of Ballycastle bay, and appear quite different from the common fossils of the country, may be traced also directly opposite, running under Raghery, with circumstances which almost demonstrably ascertain it to be a continuation of the same general strata.

WHAT I would infer from hence is, that, this whole coast has undergone considerable changes in the course of successive ages;—that, those abrupt promontories, which now run wildly into the ocean, in proud defiance of its boisterous waves, have been rendered broken and irregular by some violent convulsion of nature;—and that the island of Raghery, standing, as it were, in the midst between this and the Scottish coast, may be the surviving fragment of a large tract of country, which, at some period of time, has been buried in the deep.

BUT

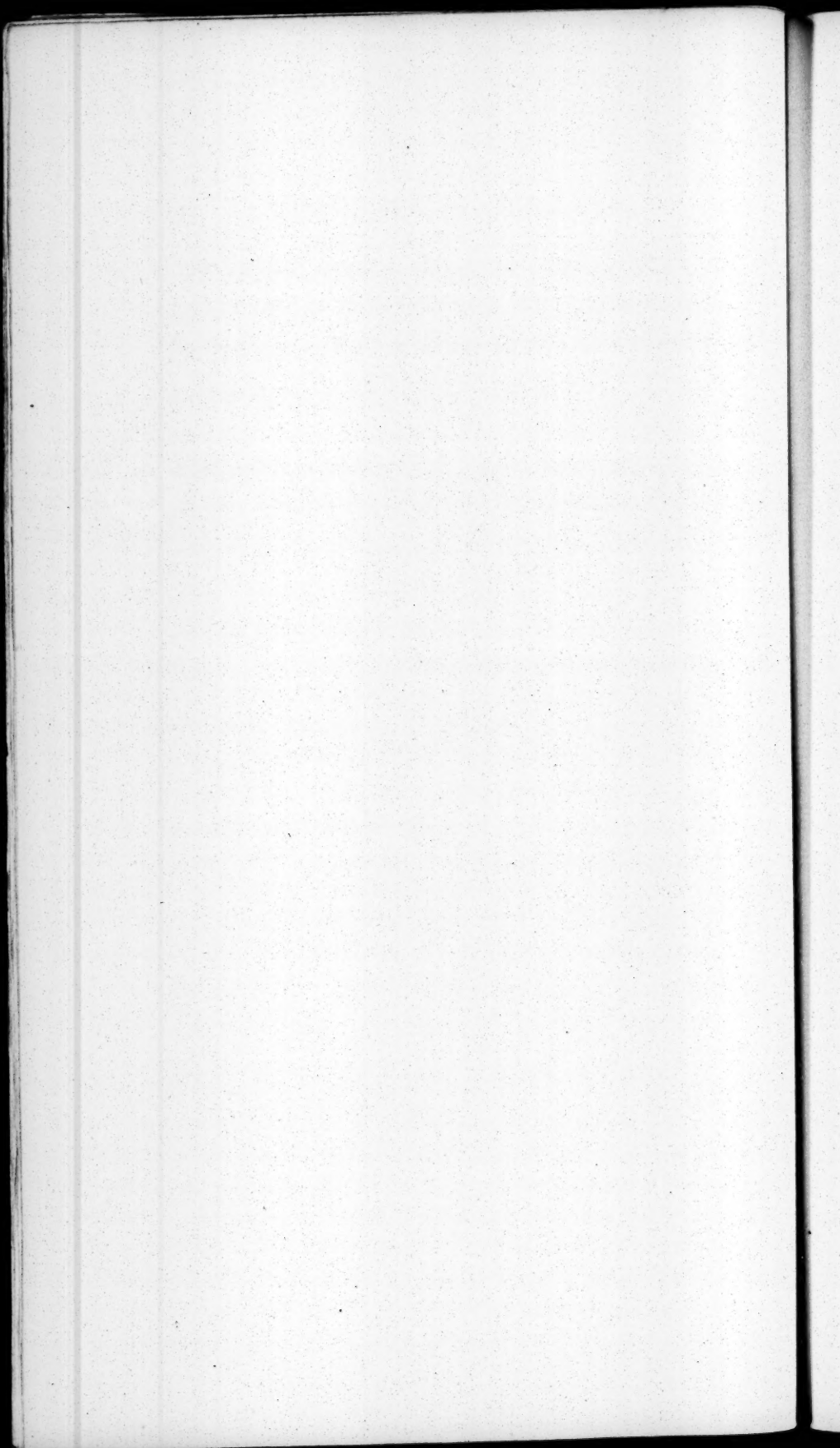
BUT I shall wave this tedious subject for the present, and endeavour to compensate for the dryness of this letter, by some account of the state and singularities of this little island.

IN the mean time, I must entreat you will be so candid, as to give me timely notice whenever my letters become dull and unentertaining—I shall otherwise employ my labour to very bad purpose, as the chief object of them is to amuse you.

I am, dear Sir,

Your affectionate, &c.

LETTER



LETTER II.

Portrush, July 27, 1784.

DEAR SIR,

THE remarkable haziness, which has prevailed in our atmosphere, during the whole of this summer, both by sea and land, has been very unfavourable to views along the coast; and, even in the short trip I made to Raghery, gave me reason to be apprehensive of missing our course, as the rapidity of the tides soon carries a vessel clear of the island. However, with the assistance of a gleam from the meridian sun, we got safely across the channel in the space of two or three hours.

RAGHERY

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RAGHERY is near five miles in length, and about three quarters of a mile in breadth; toward the middle, it is bent in an angle, opposite to Ballycastle, and forms a tolerable bay, affording good anchorage, in deep water, with a stiff clay bottom; but a westerly wind raises such a heavy swell all along this coast, that few vessels can ride out a gale from that quarter.

ITS tides are very remarkable.—Here it is, that, the great body of water, which flows from the ocean during the flood tide, to supply the north part of the Irish channel, is first confined and broken in its course; and a large portion of it is returned, near the west end of the island, in a counter tide, which supplies all the loughs and bays for the space of thirty miles, running toward the west, along the counties of Antrim, Derry and Donegal; while in the mean time the true tide of flood runs toward the east, at the distance of a few miles from the coast, parallel to the former.

FROM

FROM such eddies as this, many singular irregularities arise, and in several places the tide from the westward, (or the flood tide, as they denominate it) appears to flow nine hours, while the ebb continues only three.

SEAMEN who are accustomed to navigate along this coast, know well how to use these different streams to good purpose. For example: A ship leaving Dublin with the flood tide, (which comes into the Irish channel from the southward) may, with a leading wind, reach the county of Down; there, the vessel will fall in with the northern tide of ebb, just then beginning to return to the ocean. With the assistance of this current, and the same leading breeze, the ship may fetch the isle of Rathery; where a judicious pilot, instead of opposing the returning tide of flood, may drop into the northern eddy, which will carry him as far as Lough Swilly; where the true tide of ebb will again receive him, and bear his ship out to the western ocean.

THUS,

THUS, by prudent management, may he enjoy the advantage of four different successive tides, all favourable to his voyage.

THE western winds, (which prevail here during far the greater part of the year) sweeping, with an uninterrupted blast, over the Atlantic Ocean, roll a most formidable wave along this coast, of which I had some experience in crossing to the island.—The day was uncommonly still, not a breath of wind to ruffle the water, and yet, a heavy majestic swell, ever heaving forward, seemed to threaten ruin to our boat, and frequently hid from view even the lofty promontory of Fairhead: From this unruffled surface however there was not the slightest danger to be apprehended, and our vessel rose and descended on the glassy wave with entire security. How changed was this scene in the course of a few hours!—The moment that the ebb began to return to the ocean, rushing in opposition to this western swell, all was confusion and tumult. The long wave which, but just before, rolled
forward

forward in silent majesty, was now fretted and broken into a tempestuous sea, which the stoutest boats dare not encounter, and even the best ships wish to avoid.

THIS alternate scene of peace and war, takes place twice every day, and it is by attention to this circumstance, that the passage is made with tolerable security.

THE little skiff in which I navigated, was built of very slight materials, and did not seem to me well calculated to buffet these stormy seas. I observed that we had received a good deal of water into it; and on expressing my uneasiness that there was no visible means of throwing it out, one of the boatmen instantly took off his brogue, with which he soon cleared the vessel of water, and put it on his foot again, without seeming to feel the slightest inconvenience from the wetness of it, leaving me quite at ease on the subject of pumping the vessel.

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RAGHERY contains about twelve hundred inhabitants, and is rather over-peopled, as there is no considerable manufacture which might give employment to any superfluous hands*.

THE cultivated land is kindly enough, and produces excellent barley. In a plentiful year, grain of this species has been exported to the value of six hundred pounds. The craggy
pasturage

* From a census since held by the priest of the island, in order to lay a tax of one shilling on each person above the age of sixteen years, for the purpose of erecting a mass house, it appears, that, the numbers amount to eleven hundred; there are one hundred and forty families, which, therefore, almost average at the rate of eight persons to each family. The census has produced a great deal of uneasiness in the island, from an opinion that one person will die, during the year, in each family so numbered.

The following return was given in to Parliament, in a memorial, by Mr. John Gage Clerk, in the year 1758: "The island of Rathlin is five miles in length, and one in breadth, it contains about 2000 plantation acres, there are in it 130 families, &c." See *Journals of the Irish House of Commons*, A.D. 1758.

pasturage fattens a small, but delicious breed of sheep. Even its inhospitable rocks supply to the hand of industry a rich source of wealth, in the sea weed it affords for the manufacture of kelp, which, under an indulgent landlord, often goes near to pay the whole rent of the island*.

THE

* This year an hundred tons of kelp have been exported from Raghery, which was bought by the linen bleachers of the North of Ireland at 5l. 5s. per ton, the whole amounting to more than 525l. The annual rent of the island is but 600l. This entire manufacture is carried on by women and children, while the men are employed in more hazardous services. At low water, the sea weed is cut from the rocks, and spread out before the sun to dry; at night, it is made up in little parcels, which are opened and shaken out again in the day time, whenever the weather permits; this process is continued till the weed becomes dry enough to be burnt. A hole is then made in the ground, and a little temporary kiln erected, of loose stones, in which the weed is cautiously and gradually burned. During this process, the vegetable salt, and every thing not capable of being easily dissipated by the fire, melts, and coalesces in one mass at the bottom of the kiln. In this state it is exported, no means having been yet established here, or on any part of the adjoining coast,

THE horses, as well as the sheep, are small in kind, but extremely serviceable, and sure-footed beyond conception. Of this I had a strong proof in a little expedition which I made through the island in company with Mr. Gage, the hospitable proprietor of it. You must know, it was but the other day the people of Raghery recollected, that, a road might be some convenience to them, so that in our excursion we were obliged to follow the old custom of riding over precipices, which would not appear contemptible, even to a man who enjoyed the full use of his legs.

It

to purify the alkaline salt from the various mixtures of marine salt, &c. with which it abounds.

The attention and industry of the Scotch nation, has been very successfully directed to the kelp trade of this part of the north of Ireland. Scotch kelp has, for many years, borne a fairer character, and of course, a higher price in England, than the same article from this country: Of this difference, the Scots have industriously made advantage for themselves, buying up the kelp of this coast, at the Irish price, and thence transporting it in their own vessels to the English market, under the more marketable character and higher price of Scotch kelp.

It seems my horse, though fifteen or sixteen years old, had seldom before felt a bridle in his mouth, and after many attempts to shake it off, in a very critical situation, on the top of a rugged precipice, he refused to proceed one step further, while this troublesome incumbrance impeded him. Having no other resource, I was obliged to comply, and was carried over an exceeding dangerous heap of rocks, with a degree of caution which amazed me in the midst of my terrors.

It is somewhat singular that this island should not contain any native quadruped, except those universal travellers the rats*, and the little shrew mouse, which is sometimes found. But the various tribes of foxes, hares, rabbits, badgers, &c. for which it might afford

* I had some hope that the native black rat of this kingdom, might have secured a retreat in this sequestered island; but in vain; their powerful invaders, with the cruelty of the old Danes, but with more success, have utterly exterminated the natives; and the rat of Norway (as it is usually denominated) has completely extended his wasteful dominion over Raghery.

ford excellent shelter, and which abound on the opposite shore, are here unknown. A few brace of hares indeed were lately introduced by the proprietor, which bid fair to produce a large encrease.

A GOOD many years ago, Lord Antrim gave orders to his huntsman to transport a couple of foxes into the island, for the purpose of propagating that precious breed of animals. But the inhabitants assembled in consternation, and having subscribed each a hank of yarn, prevailed on the huntsman to disobey orders. However, he was sharp enough to take the hint, and for some years paid his annual visit to Raghery, for the purpose of raising a regular tribute, to save the poor islanders from those desolating invaders.

THE inhabitants are a simple, laborious, and honest race of people, and possess a degree of affection for their island which may very much surprize a stranger. In conversation they always talk of Ireland as a foreign kingdom,

kingdom, and really have scarce any intercourse with it, except in the way of their little trade.—A common and heavy curse among them is—“May Ireland be your hinder
“ end.”

FROM this amor patriæ arises their great population, notwithstanding the perils which attend their turbulent coast, as they never entertain a thought of trying to better their fortune, by settling in any of the neighbouring towns of Antrim.

THE tedious processes of civil law, are little known in Raghery ; and indeed, the affection which the inhabitants bear to their landlord, whom they always speak of by the endearing name of master, together with their own simplicity of manners, renders the interference of the civil magistrate very unnecessary. The seizure of a cow or a horse, for a few days, to bring the defaulter to a sense of duty, or a copious draught of salt water from the surrounding ocean, in criminal cases, forms the
greater

greater part of the sanctions and punishments of the island. If the offender be wicked beyond hope, banishment to Ireland is the dernier resort, and soon frees the community from this pestilential member.

IN a sequestered island, like this, one would expect to find bigoted superstition flourish successfully under the auspices of the Romish church; but the simplicity of the islanders does not foster any uncharitable tenets; and, contrary to one's expectation, they are neither grossly superstitious, nor rank bigots, but have been known to hold the unchristian doctrines of their late Spanish priest in great contempt—nay, in cases of necessity, they do not scruple to apply for assistance to the Protestant minister. Of their good will to the established church they give an annual proof, which one rarely finds in any other part of Ireland. The minister's tithe amounts to about 100*l.* per annum, and when the islanders have got in their own harvest, they give the parson a day of their horses and cars,

cars, and bring the entire tithe home to his farm-yard.

THE chief desideratum of the islanders is a physician, the want of whom they seem to consider as their greatest misfortune, though their *master* appears to be of a very different sentiment; and indeed, the remarkable population of Raghery makes much in favour of his opinion.

SMALL as this spot is, one can nevertheless trace two different characters among its inhabitants. The Kenramer * or western end, is craggy and mountainous, the land in the vallies is rich and well cultivated, but the coast destitute of harbours. A single native is here known to fix his rope to a stake driven into the summit of a precipice, and from thence, alone, and unassisted, to swing down the face of a rock in quest of the nests of
 sea

* *Cean-rambar*, the large head or promontory, in opposition to the smaller size of the eastern extremity of the island.

sea fowl. From hence, activity, bodily strength, and self-dependence, are eminent among the Kenramer men. Want of intercourse with strangers has preserved many peculiarities, and their native Irish continues to be the universal language.

THE Ushet end, on the contrary, is barren in its soil, but more open, and well supplied with little harbours; hence, its inhabitants are become fishermen, are accustomed to make short voyages, and to barter. Intercourse with strangers has rubbed off many of their peculiarities, and the English language is well understood, and generally spoken among them.

THIS distinction I fear may seem foolishly speculative, considering the diminutive object of it, and yet I assure you it is a matter of fact; and the inhabitants themselves are so well aware of it, that in perilous situations, different offices and stations are appointed to each,

each, according as he is an Ushet or Kenramer man.

RAGHERY has formerly been, as it were, a stepping stone between the Irish and Scottish coasts, which the natives of each country alternately used in their various expeditions, and for which they frequently fought.

A NUMBER of small tumuli were lately opened in a little plain about the middle of the island, probably the monuments of so many heroes, who in former ages, had fallen honourably in this very field of battle. The chief himself lay in a stone coffin, and beside him an earthen vessel stood, which, by the residuum still visible, seemed formerly to have contained an offering of blood, or some other perishable animal substance. Within the tumuli lay a considerable number of human bones, the remains of more ignoble men, who might have fallen by the like fate of war.

BRAZEN swords, and spear heads of the same metal, found in this plain, bear strong evidence of the bloody scenes which have been transacted here in remote ages. A large fibula was found in one of the tumuli, which is deposited in the museum of Trinity College, Dublin; the workmanship is good, and argues considerable skill in the artist.

THE traditions of the country do not go beyond the obscure period of Scottish and Danish incursions, which have, alternately, ravaged and depopulated the island. The memory of a cruel massacre, perpetrated by a Scottish clan (I think the Campbells) remains so strongly impressed on the minds of the present inhabitants, that no person of that name is allowed to settle in the island*.

DURING

* In consequence of successive barbarities of this sort, committed by various savage invaders, during the unsettled ages of Ireland, this island became at length totally uninhabited; in which state it is represented, in a manuscript of the country, so late as the year 1580. See note on Letter vii. of this work.

DURING the disturbances in Scotland, which succeeded the appointment of Baliol to the crown of that kingdom, Robert Bruce was driven out, and obliged to take shelter with a friend of his in the isle of Raghery*. However his enemies pursued him even to this

* Rex ipse cum uno plerumque comite, interim solus, per loca maxime inculta pererrabat, et cum ne sic quidem sibi tutus a civium perfidia et hostium crudelitate videretur, in Æbudas, ad veterem quendam amicum transmisit. It is probable this was the time when Bruce came to the isle of Raghery, which is classed by Buchannan among the Æbudæ, or western islands of Scotland, under the name of Ralinda.—See *Buchannan*, l. 1. p. 25. *Elzevir Edit.*

In Henry's History of England it is said, that he took refuge in the small island of *Rucrin*, one of the western islands.—See *Henry's England*, vol. 4. p. 75. *Dublin Edit.*

It is not unlikely, that Bruce was indebted to his friends in the north of Ireland, for those brave forces, with which, to the amazement of his enemies, who looked upon him as dead, he started forth from his obscure retreat, supporting his shattered party in Scotland against the victorious arms of the first Edward; and afterwards, finally defeated the vast army brought against him by Edward the second.

The silver coins of Robert Bruce, are still found, in considerable quantity, through the north of Ireland; (*See coins*
in

this remote spot, and forced him to embark in a little skiff, and seek refuge on the ocean. The remains of a fortress are yet visible, on the northern angle of the island, celebrated for the defence which this hero made in it, and still known by the name of Robert Bruce's castle. The antiquity of this building is therefore not much less than five hundred years; it may indeed be considerably older, as the time which Bruce spent in Raghery was scarce sufficient for the purpose of erecting it.

ONE thing concerning this castle is worth remarking; that the lime with which it is
built

in the Museum of Trinity College Dublin; see also the Earl of Charlemont's collection) and as neither the north of Ireland nor Scotland was, at that period, in a situation for extensive dealings in trade, it may reasonably be conjectured, that this money was brought hither for the purpose of raising levies of men, rather than in the regular course of merchandize. Indeed, the history of those times gives reason for supposing, that, the independent Scots and northern Irish, had engaged in a common cause of exterminating the English authority in their respective countries.

built has been burned with sea coal, the cinders of which are still visible in it, and bear so strong a resemblance to the cinder of the Ballycastle coal, as makes it extremely probable that *our* information concerning the collieries of that place, is far from being an original discovery *. Indeed there is reason to believe that they were both well known, and extensively wrought, at a period of time when few people imagine that either the civilization, or finances of this kingdom, were equal to so expensive an undertaking ‡.

BUT

* Some pieces of the cement of this ruined castle, containing cinders, may be seen in the Museum of Trinity College Dublin.

‡ It may perhaps be imagined that the coals might have been brought from Britain; but a little reflection will shew that supposition to be extremely improbable, even so late as the time of Robert Bruce. It was but just then that the English themselves had discovered the use of sea coal, as a fuel; and we find, in the time of Edward the First, that, after being tried in London, they were immediately prohibited, on an hasty opinion that the vapour was noxious to the health of the inhabitants. It is not therefore to be readily believed, that, at this early period, England could

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BUT this is a curious subject, and I shall take some other opportunity of giving you more information, when you may not be fatigued with so large, and, I fear, so tedious a letter.

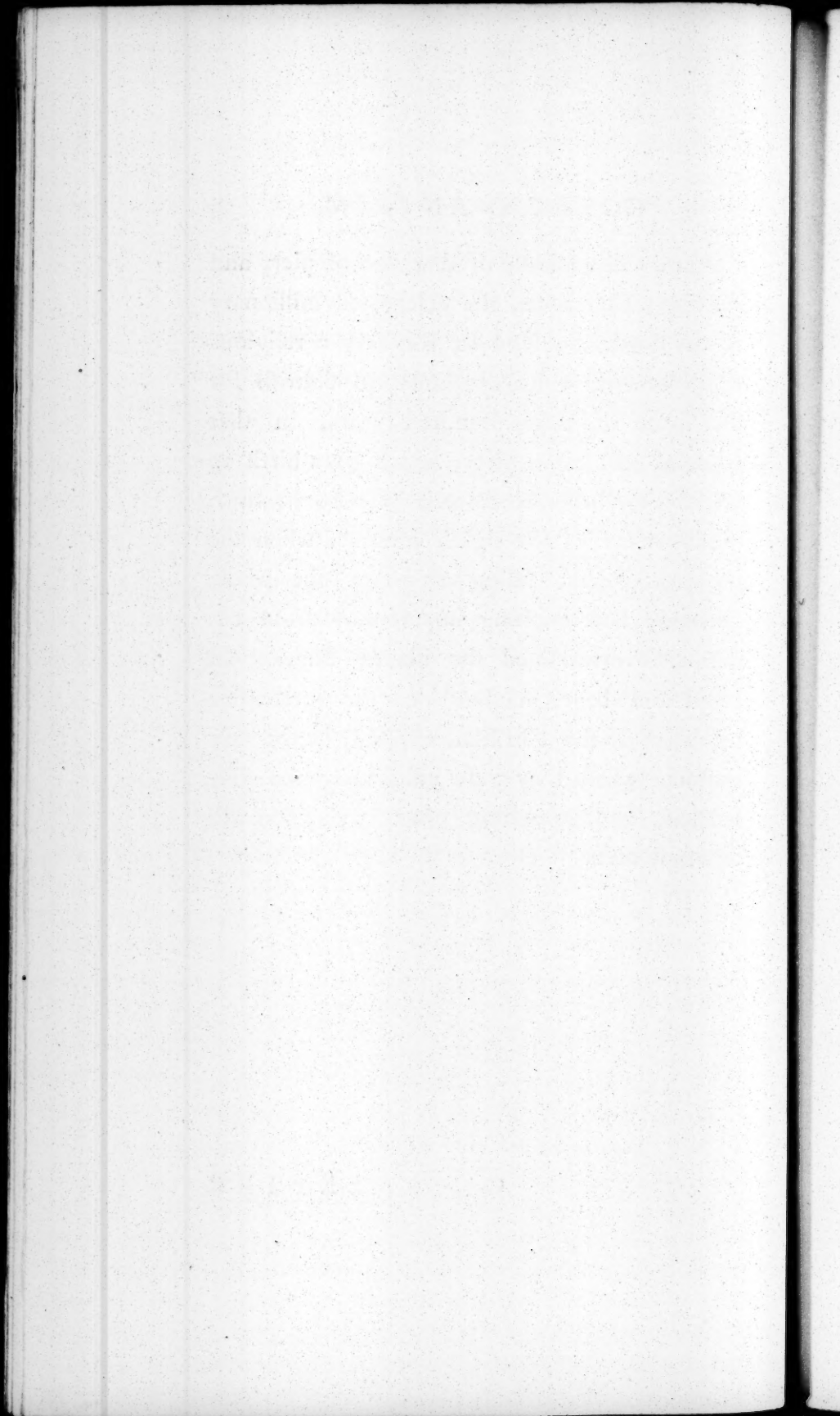
ALTHOUGH the *traditions* of this little island, do not reach beyond that troubled torrent of events, which followed the invasions of the Danish fleets, and has separated the ancient, from the modern history, of this kingdom, by a barrier, beyond which mere tradition cannot pass; yet there exists, from other means, sufficient evidence, that Raghery was well inhabited, and had even a regular military array, as early as the commencement of the sixth century*.

ABOUT

could have had any extensive export trade in coals: Or, if so, it must have been to some populous and civilized country, to some safe harbour, to a great and commercial town; but, at the time we speak of, the British charts do not lay down a single village in all this line of coast.

* See Archdall's *Monast. Hist.*

ABOUT the middle of that age of piety and learning, Columbus, the celebrated missionary of the north, founded in Raghery a religious establishment, which continued to flourish for the space of three hundred years, in that peaceful and calm piety, which gives birth to few events suited to the pen of history; until the latter end of the eighth century, when the northern storm, filling at once the whole horizon, and bursting impetuously from the ocean, overwhelmed the island; burying in blind and brutal destruction, the inoffensive ministers of the Christian religion, in the very moment when they were cultivating the olive branch, and preaching peace and good-will amongst men.



L E T T E R I I I .

Portrush, July 30, 1784.

DEAR SIR,

I N my return from Raghery I spent a few days at Ballycastle, a town pretty considerable in this part of the world, which has been almost entirely the creation of one man, a Mr. Boyd, who died some years ago.

ACCORDING to the Persian system of moral duties*, it is likely Ireland cannot boast of an individual who has more fully dis-

C 2

charged

* Faire un Enfant, Planter un Arbre, & Labourer un Champ.—*Vide Montesquieu's Persian Letters.*

charged his trust, than old Mr. Boyd; not possessed of any considerable fortune, not supported by powerful natural connexions, nor endowed with any very superior talents, this man opened public roads, formed a harbour, built a town, established manufactures, and lived to see a wild and lawless country become populous, cultivated and civilized.—In the most literal sense, his soul seems to have animated this little colony; in him it enjoyed life and strength, and with him all vigour and animation perished.—By an ill-judged distribution of his fortune, and various untoward and unforeseen accidents, the manufactures of glass were neglected, the breweries and tanneries were mismanaged, the harbour became choaked up with sand, and even the collieries (from particular circumstances) are not wrought with such spirit as the present proprietor would wish to exert.—In short, this gentleman constructed a most excellent machine, but unfortunately left it without any permanent principle of motion.

HE was buried in a neat and beautiful chapel, (whose establishment had been the favourite object of his old age) on the same day in which it was consecrated to the religious service of the public.

THE eastern side of Ballycastle bay terminates in the bold promontory of Fairhead.—Between this and the town lie the collieries, in an abrupt bank which overhangs the sea: Ships however cannot derive much advantage from this circumstance, as the unprotected situation of the place, and the prevailing western winds, makes a delay on the coast extremely dangerous, and renders it difficult to embark the coals.

THE different fossils commonly situated above the coal of this place are, iron-stone, black shivery slate, grey brown or yellowish sandstone, and basalt, or (as it is here called) whin-stone*.

OF

* Crystals of martial vitriol also occur, in situations where the iron stone happens to be in immediate contact with the beds

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OF these, the three former appear to constitute the strata usually attendant on coal, in the northern counties of Ireland; but the basalt is a fossil which rarely occurs any where in its neighbourhood, and may be reasonably esteemed altogether adventitious. In the present instance, at least, it seems to bear the character of a foreign substance, which, issuing from the vast mass of basalt that forms the northern extremity of Fairhead, has descended over the adjoining strata, diminishing gradually in thickness as it proceeded forward, and filling up each cleft and vacuity, that occurred during its course.

ALL these strata are tolerably regular in their disposition, forming a small angle with the horizon toward the south, and shewing their edges in the steep cliff itself, or, (as miners term it) *bassetting* toward the north.

But

beds of coal. The vitriolic acid from the decomposed sulphur of the coal, uniting with the calx of the iron, oftentimes forms a thin layer of these crystals of green vitriol.

But it happens, not infrequently, that they are strangely intersected by thin septa of hard and firm basalt, which, standing perpendicular to the horizon, in defiance of the general order and situation of the other substances, cut them as it were in twain, forcing through every opposing barrier in a precipice three or four hundred feet high, and thence, pursuing a direct and uninterrupted course, as far as the eye can trace them under the surface of the sea, or as far as human industry and perseverance has attended them, into the bowels of the earth*.

THE thickness of these partitions is very inconsiderable in proportion to the great extent of their other dimensions, few of them exceeding twelve feet in the transverse measure. Independent however of the singular structure

* These partitions are known by the term *gaw* or *march*, and seem pretty much to agree in situation with the *cross goffan* of the Cornish miners. A very remarkable wall of this species may be seen at the North Star Mine in Ballycastle bay.

structure and situation of these iron walls, there is a circumstance frequently connected with them, which, in its own nature, is extremely curious, but to the miner becomes an object of the greatest importance. Whatever be the order, and thickness, of the various beds of fossils, which occur on one side of any of these perpendicular divisions, the same general arrangement and proportions may, with great probability, be expected on the other side; only with this difference, that the entire mass will oftentimes be found to have altered its relative place, each stratum appearing in a more elevated, or depressed situation, on one side of the partition than on the other; so that correspondent beds will no longer be found in one and the same plane, but must be sought for at different degrees of elevation*.

THUS,

* Besides this difference in the elevation of correspondent strata, on opposite sides of these partitions, it often happens that their inclination to the horizon is also different: Instances of a similar dislocation and displacement of strata may be seen in Mr. Whitehurst's account of Derbyshire.

THUS, the miner, who has occasion to break through one of these thin divisions, is almost certain that he will immediately lose the bed of coal, in which a few minutes before he was working; and it is only by comparing the stratum into which he has pierced, on the unexplored side of the partition, with the correspondent one, on that side where he has already wrought, that he is directed, whether to work upward, or downward, in search of the course of coal*.

It seems as if this eastern barrier of Ballycastle bay, had, at a certain period, been shaken

* I had an opportunity of seeing an instance pretty much in point, at a new work begun in the year 1787. A perpendicular shaft was sunk near low water mark, for the purpose of falling in with a bed of coal, which bassetts under the sea: while at the distance of a few yards, but on the further side of one of these gaws, an horizontal adit was carried forward to the correspondent stratum, whose edge appears high in the cliff, not less than thirty feet above the level of the sea. So that a perpendicular descent beneath the surface of the earth was necessary for arriving at the bed of coal on one side of the partition; whilst an horizontal adit conducted to it on the other side.

shaken by some violent convulsion, capable of rending it asunder into extensive clefts and chasms; whilst large masses, sometimes sinking at these fissures, became displaced, preserving indeed the particular disposition and arrangement of their strata, but subsiding into an inferior situation. If one can suppose, that, the basaltic (which almost universally covers this northern coast,) had over-run the subjacent soil, at any period subsequent to the time of this convulsion, under such circumstances of softness, or fluidity, as might admit its following the general inclination of the surface, and sinking into each hollow and fissure that occurred in its course, it may not perhaps be difficult to imagine all these gulphs and chasms, the frightful evidences of former ruin, to be entirely filled up; and to see this shattered heap of displaced strata connected together, and, as it were, renovated, by intervening courses of basaltic, assuming the appearance of those iron walls which I just now mentioned.

I AM

I AM not so unreasonable as to ask, or even to hope for, your implicit acquiescence in this fanciful theory concerning the formation of these extraordinary partitions; but, at some future time, I may possibly endeavour to render it more plausible, by considering the nature of that substance of which they are composed, and its attendant circumstances. In the mean while, I hope to derive this advantage, at least, from my theory, that you will more clearly apprehend the manner in which these various strata are situated and connected with each other; for an hypothesis must be very bad indeed, if it do not help to illustrate the author's meaning and description.

THE Ballycastle collieries are not at present very productive, nor, were they wrought to the best advantage, do they seem capable of supplying any extensive demand, while confined to the beds which basset in the cliffs, whose thickness seldom exceeds four feet, and whose extent is limited within narrow bounds: hence, it is well worth attention, whether there
be

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be any hope of discovering the source of a more copious supply, by sinking in search of coal to greater depths, and even beneath the level of the sea itself.

It is indeed a matter of much difficulty, to speculate with a reasonable degree of probability, concerning such strata as may lie deep within the foil of this kingdom, by any arguments deduced from those that are examined nearer to the surface; because, the business of mining has been so imperfectly conducted, and the country in general so little explored at considerable distances beneath its surface, as scarce to afford any precise and clear analogies, which might serve to assist the judgment in doubtful cases like the present: but, if one may be permitted to apply arguments borrowed from the foil of the neighbouring kingdom of Britain, for the purpose of reasoning concerning our own, it should appear not improbable, that, the deeper strata at Ballycastle, which basset under the sea, might afford a more productive and valuable supply of coal than
can

can ever be expected from the present mines*.

It is true, that, this mode of reasoning from the fossils of one kingdom, to those of another, should be used with extreme caution; but the success of old Mr. Boyd, in a sub-marine work, unhappily neglected since his death, appears to give strong support to it in the present instance.

THAT gentleman, in whom a prudent judgment seems to have been happily combined with a steady and vigorous industry, had sunk several shafts to a bed of coal, which lay deep beneath the level of the sea. At a period, when the steam engine and its effects were little known, his vigorous perseverance enabled him to conduct a powerful stream from a distant river, along the precipice which rises from the shore, where, by means of an engine, he was able, cheaply and effectually,

* The celebrated Whitehaven coal-pits are wrought to very great depths under the sea.

ally, to clear off the water from his sub-marine works; and from these pits, it is said, an abundant supply of coal was produced during the latter part of his life. Whilst this engine preserved itself in order, so long was the mine wrought to good account; but the unfortunate distribution of his property, rendering it inconvenient for his immediate successor to embark in any considerable expence, so soon as a part of the engine became decayed, the whole was suffered to fall into disorder; the river flowed again in its natural channel; and the works either tumbled in, or became deluged with water, presenting nothing to view but the melancholy ruins of old Mr. Boyd*.

I remain your's.

* It may be a matter of curiosity, and possibly of utility, to have the means of comparing the strata of Ballycastle, with those of other collieries in distant parts of the kingdom, for which reason an account of them is subjoined, from a letter written by John Evans, miner.

Account

COAST OF ANTRIM.

47

Account of the Ballycastle Strata, above, and under the present working Coal, at Gobb Mine, by John Evans, Miner.

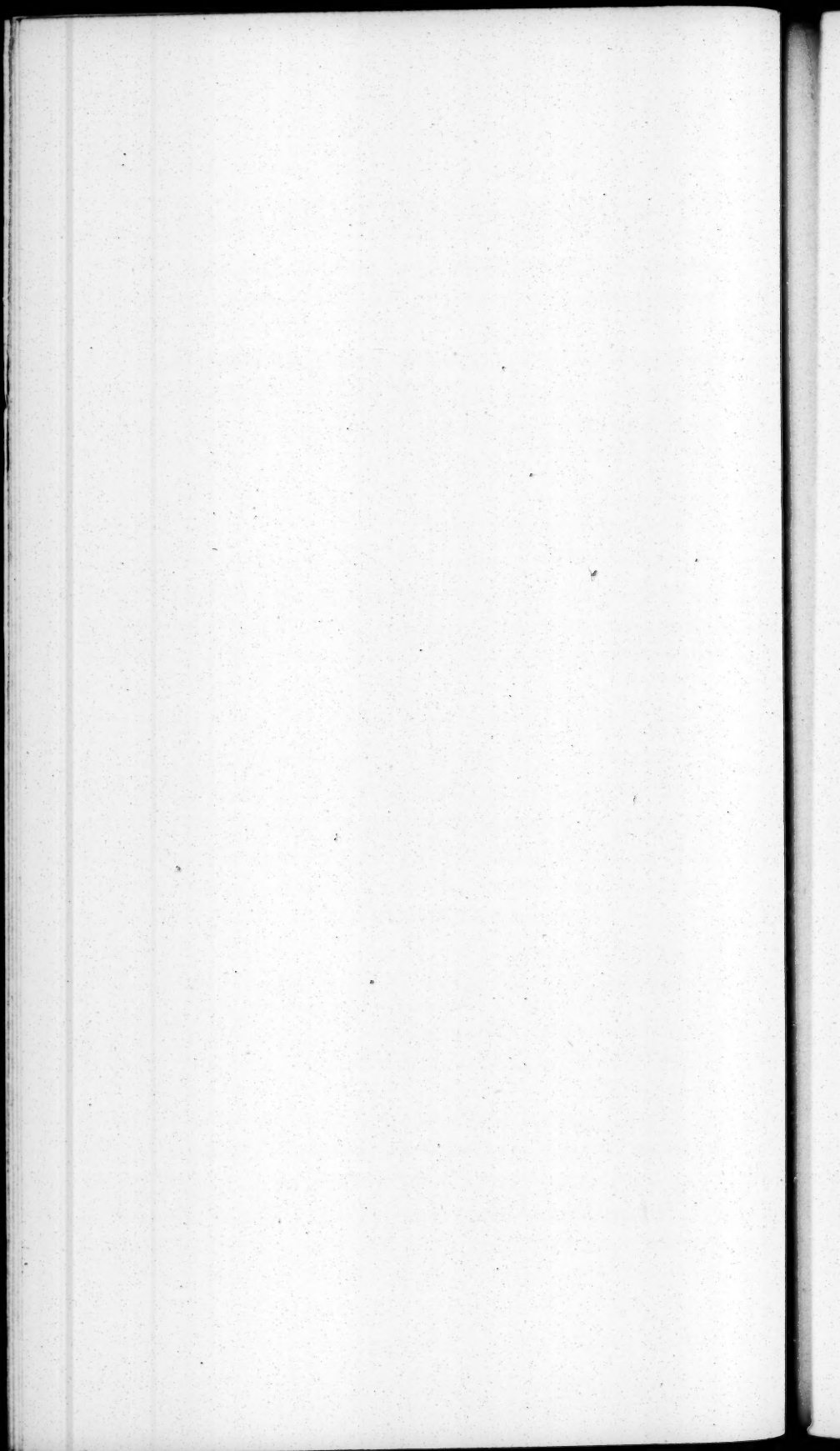
Yds. Feet.

Whin-stone	-	-	20	0	This is the same species of stone as the basalt of Fairhead, and is imperfectly columnar.
Floating slate	-	-	3	0	
Yellow freestone	-	-	14	0	
Slate and coal	-	-	7	0	
Hard grey freestone	-	-	30	0	
Present working coal	-	-	1	2	
Slate, the seat of the coal	-	-	-	0	2
Coal	-	-	-	0	2
Bording and slate	-	-	6	0	
White freestone	-	-	12	0	
Coal and slate	-	-	1	0	
Grey freestone	-	-	12	0	
Shivery freestone	-	-	7	0	

Thus far the disposition and thickness of the strata, appears to be marked with tolerable exactness, as far as one can judge by looking at the face of the precipice. It is difficult to observe with accuracy the lower strata, because of the rubbish, covered with an imperfect vegetation, toward the base of the cliff.

Slate	-	-	-	0	2	
Yellow freestone	-	-	-	10	0	
White limestone	-	-	-	1	2	Greyish limestone, abounding in marine shells; occurs hereabouts.
Coal	-	-	-	0	1 $\frac{1}{2}$	
White freestone	-	-	-	3	0	
Blue bind	-	-	-	1	2	
Sand stone bind	-	-	-	1	2	
Main coal, covered by the sea	-	-	-	6	0	This is not known to the present workmen.

Total - 145 Yards.



LETTER IV.

DEAR SIR,

IN a former letter, I mentioned some reasons, derived from the cement of an ancient castle in the island of Raghery, which might induce one to think, that, the Bally-castle collieries were wrought at a remote period of time*; but an accidental discovery seems

* See Letter II. page 30.—It is there mentioned, that a ruined castle, celebrated, almost 500 years ago, for the defence which Bruce made in it against his enemies, in the reign of Edward the 1st, was built with mortar through which the cinders of sea coal are, at this day, distinctly visible; from whence a reasonable proof was derived, that,

seems to have put that matter beyond doubt, and has laid open a very curious circumstance in the ancient history of this country.

ABOUT

at some period as early as the year 1300, sea coal had been used as fuel in the island of Raghery.

Further reflection on the subject might lead one to suppose, that the building of this castle was of much more ancient date, because in the time of Edward I. the kingdom of Ireland was an almost uninterrupted forest; so that the abundance of more convenient fuel would then have anticipated all necessity of searching for fossil coal: indeed for several ages subsequent to the year 1171, at which time, the English invaders found Ireland to be a country overrun with wood, (*Girald. Cambrensis*) instructions may frequently be found among the annual orders of government, to have successive portions of forest cleared away, for the purpose of rendering the country accessible to the English forces; and it was not until four hundred years after, (about the latter end of Elizabeth's reign) that any considerable progress was made in this work of devastation.—*Boates's Nat. Hist. of Ireland.*

The architecture of the building itself, would perhaps have afforded data, from whence the æra of its erection might have been reasonably conjectured; but nothing remains, at present, except a small portion of the foundation, standing on the brink of a precipice, entirely destitute of all ornament, and style of architecture; or any *unusual* marks

ABOUT the year 1770 the miners, in pushing forward an adit toward the bed of coal, at an unexplored part of the Ballycastle cliff*, unexpectedly broke through the rock into a narrow passage, so much contracted, and choaked up with various drippings and deposits on its sides and bottom, as rendered it impossible for any of the workmen to force through, that they might examine it farther†. Two lads were therefore made to creep in with candles, for the purpose of exploring this subterranean avenue‡. They accordingly pressed forward for a considerable time, with much labour and

D 2

difficulty,

marks either of ignorance or skill in the builder, unless what may be derived from the circumstance of the cinders being suffered to remain amid the cement.

* The mine opened here has since been called the *north star*, from its superior value.

† Scarce any sensible contraction of dimensions has taken place in the passages which were opened here 60 years ago, for the purpose of reaching the beds of coal in these cliffs.

‡ Their names were *James M'Kiernan* and *William M'Neal*; they are still employed as miners about these collieries.

difficulty, and at length entered into an extensive labyrinth, branching off into numerous apartments, in the mazes and windings of which they were completely bewildered and lost. After various vain attempts to return, their lights were extinguished, their voices became hoarse, and exhausted with frequent shouting, and at length, wearied and spiritless, they sat down together, in utter despair of an escape from this miserable dungeon.

IN the mean while, the workmen in the adit became alarmed for their safety, fresh hands were incessantly employed, and, in the course of twenty-four hours, the passage was so much opened as to admit some of the most active among the miners;—but the situation of the two unhappy prisoners, who had sat down together in a very distant chamber of the cavern, prevented them altogether from hearing the noise and shouts of their friends, who thus laboured to assist them.

FORTUNATELY

FORTUNATELY it occurred to one of the lads, (after his voice had become hoarse with shouting) that the noise of miners hammers was often heard at considerable distances through the coal works; in consequence of this reflection, he took up a stone, which he frequently struck against the sides of the cavern; the noise of this was at length heard by the workmen, who, in their turn, adopted a similar artifice; by this means each party was conducted toward the other, and the unfortunate adventurers extricated time enough to behold the sun risen in full splendor, which they had left the morning before just beginning to tinge the eastern horizon.

ON examining this subterranean wonder, it was found to be a complete gallery, which had been driven forward many hundred yards to the bed of coal*: That it branched off into numerous

* The adit had been carried forward about 450 yards, or a little more than a quarter of an English mile, and the level industriously preserved.

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numerous chambers, where miners had carried on their different works*: That these chambers were dressed in a workman-like manner†: That pillars were left at proper intervals to support the roof: In short, it was found to be an extensive mine, wrought by a set of people at least as expert in the business as the present generation. Some remains of the tools, and even of the baskets used in the works, were discovered, but in such a decayed state, that on being touched, they immediately crumbled to pieces‡.

THE

* There were 36 of these chambers discovered, and esteemed so valuable as again to be occupied by the workmen who discovered them.

† The sides and supports of the pits were even, and well squared: that part of the coal which lay contiguous to the gaw (see Letter III.) was rejected by the old workmen; it is used by the present miners, who make no other objection to it, except that it breaks entirely into slack.

‡ From the remains which were found, there is reason to believe that the people who wrought these collieries
anciently,

THE antiquity of this work is pretty evident from hence, that there does not remain the most remote tradition of it in the country ; but it is still more strongly demonstrable from a natural process which has taken place since its formation ; for the sides and pillars were found covered with sparry incrustations, which the present workmen do not observe to be deposited in any definite portion of time.

THE people of this place attribute these works to the Danes ; but a very slight consideration of the subject must satisfy any one that this opinion is ill-founded.—The Danes were never peaceable possessors of Ireland, but always engaged in bloody wars with the natives, in which they were alternately victors and vanquished.—Like the eastern descendants of Ishmael they stood at perpetual bay with all the world, their hand against every man, and every man's hand against them.

IT

anciently, were acquainted with the use of iron, some small pieces of which were found ; it appeared as if some of their instruments had been thinly shod with that metal.

IT is not surely, to the tumultuary and barbarous armies of the ninth and tenth centuries, whose harvest of wealth and power could only be expected from the rapid and hazardous ravages of war, that we are to attribute the slow and toilsome operations of peace, which are carried on only where population, civilization, and trade flourish in an extreme degree*.

WHILE

* In the year 795, the northern nations first invaded, and desolated the Irish coast, particularly the island of Recran (Raghery), which they destroyed with fire and sword, treating the professors of Christianity with the utmost cruelty.

In the year 1170, the first party of British invaders came into Ireland, to support a chieftain of the province of Leinster.

During this wretched interval of three hundred and seventy-five years, each succeeding event, in the annals of this unfortunate island, is distinguishable from the preceding, only by a variety in its general characters of ruin and desolation, or in its tides of human blood. Hence it naturally came to pass, that, “ the English invaders, under Henry “ II. did not find any stone housing at all among the
“ Irish,

WHILE Ireland lay yet prostrate, and gasping under the fatal wounds received in a bloody struggle of more than three hundred years, against these northern invaders, the English, under Henry the Second, made their successful inroad, and easily established themselves in a feeble and distracted country; from which time, till the beginning of the present century, this island presents little to our view but a wasteful scene of misery and desolation*.

THAT

“Irish, any money, any foreign trade, nor any learning; neither geometry, astronomy, anatomy, architecture, engineering, painting, carving, nor any kind of manufacture, nor the least use of navigation, nor the art military.”—*Petty's Polit. Anat. of Ireland.*

The events of this period, seem, therefore, altogether hostile to those permanent exertions of industry, which are required in the operations of extensive mining.

* Upon the first settlement of the English in Ireland, the kingdom instantly became rent into two hostile nations, whose swords continued unsheathed for ages;—mutually inveterate almost to madness, and matched, during the space of four hundred years, (from the invasion of Henry II. to the middle of Queen Elizabeth's reign,) in

A.D.
1170.

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THAT these collieries could have been wrought during this period seems extremely improbable.

in so unhappy a degree of equality, as rendered each, effectually capable of harassing the other, without the least advantage to itself.

A.D. The vigour of Elizabeth's administration, uniting a
1558. powerful British force with the collected strength of the English pale in Ireland, became, at length, decidedly superior; and after a dreadful struggle, which continued to the end of her reign, broke down every barrier from sea to sea, leaving to her successor James I. a country deluged with blood, a nation breathless, exhausted, prostrate, but not subdued; and peaceable, only because incapable any longer to raise the arm of war.

1602. James enjoyed, on the throne of England, that peace which had been so dearly purchased by the abilities of his predecessor; and, during a quiet interval of thirty-six years, the longest that Ireland had experienced for more than eight centuries, the *new English Settlers*, (as they were called,) who resorted thither in considerable numbers, brought with them the arts and industry of Britain,—mines of iron and silver were discovered and wrought; improvements in tillage were introduced; and the country, which from depopulation, and total neglect of cultivation for so many ages, had become a continued forest, being cleared in many places, began to assume a partial character of civilization.—See *Nat. Hist. of Ireland*, by Boates and others.

But

bable.—We are all along execrated by the English writers as a nation of barbarians, and our country cursed as a wilderness of forests and bogs.—It is not then to be supposed that a savage people should ransack the bowels of the earth for coal, while their woods and bogs afforded such abundant fuel to their hand.

UPON

But that unconquerable spirit, which, even the abilities of Elizabeth had only for a time overborne, but not destroyed, fully rejecting the arts of peace, nourished in silence by inveterate prejudice, by the keen remembrance of ancient claims, and by the fostering hand of a jealous religion, insensibly recovered its native strength and ferocity; and bursting at length through all its iron chains, during the unhappy reign of Charles I. involved the kingdom in a scene of horror, which humanity can have no pleasure in recording.

A.D.
1641.

The fierce and active arm of Cromwell again chained it down in blood; until the unhappy events of James the II^d's reign once more set it loose, in all the terrors of regular military array, at the convulsive close of the last century; and it is to the fortune and abilities of William III. that this kingdom is indebted for the first century of peace which it has ever enjoyed, since the days, wherein its honourable and inoffensive establishments were overturned, by the savage band of northern invaders.

1652.

1688.

1690.

UPON the whole, during the dreary interval of near a thousand years, from the eighth to the eighteenth century, it is vain to look for the laboured works of industry and peace, in a kingdom where war was the only trade, and where all property turned on the edge of the sword*.

THE

* About the middle of the seventeenth century, the first coal mine was accidentally discovered by the English settlers in the county of Carlow, and was afterward successfully wrought by Mr. Christopher Wandesforth.—*Boates's Nat. Hist.*

Shortly after this Doctor Boates wrote his Natural History of Ireland, in which he mentions, that this was the only bed of coals then known in Ireland.

Between the years 1660 and 1670 Sir William Petty had probably completed his survey of Ireland, in which the situation and circumstances of Ballycastle are noted with considerable attention; even salt works are marked as standing between the town and promontory of Fairhead, in the site of the present salt-house; but no mention whatever is made of coal works, nor even of the existence of beds of coal there, though at this period wood fuel was become a very scarce and expensive article.

IN

THE discovery of this colliery is one of those proofs, which, without directly deciding either time or persons, tend strongly to shew that there was an age when Ireland enjoyed a considerable share of civilization.—Yet, most of the English writers, conceiving this desolate and distracted kingdom to have been naturally such as they found it, eagerly pronounced it, with all the intemperate bitterness of enemies, to be a nation without laws, without monuments, without records, without any

In the year 1721 the first application was made to Parliament by the Honorable R. Stewart, Thomas Burgh, Esq; and others, for aid to work the Ballycastle collieries.—*See Journals of Irish House of Commons.*

From this recorded evidence it appears almost certain, that this mine could not have been wrought at any period subsequent to the reign of Queen Elizabeth, that is, later than the year 1602; and whoever shall launch forth into the annals of Ireland during the preceding ages, will find himself extremely embarrassed to discover any moment of time at which, either the means, or necessity of the kingdom could admit of it, until he shall have reached the peaceful shore, which bounds the turbulent chaos of events that succeeded the eighth century.

any traces whatever of former civilization : but many things which have still escaped the wreck of time, and the fury of invaders, concur in demonstrating this to be a hasty assertion.

THE round towers of Ireland are, alone sufficient to shew, that there were public monuments in Ireland before the arrival of the English*, which were *original* in their kind†, and

* Giraldus Cambrensis, who came over to Ireland with Henry II. 1172, calls them “*Turres Ecclesiasticæ quæ more patrio arctæ sunt et altæ, nec non et rotundæ.*” This authority for the existence of an ancient *style* of building in Ireland is unquestionable.

† There have been but two buildings of this species hitherto discovered out of Ireland ; they are both in Scotland, and the fashion of them has probably been borrowed from this country, where they are still extremely numerous. One of these, usually called a Pictish tower, stands at Abernethy in Perthshire, and seems to be of a very ancient date : The other is at Brechin in Angus-shire, probably much more modern than the former.

More than sixty of these curious buildings still remain in Ireland, but they are hastening rapidly to ruin.

and not inelegant in their structure.—The remains of our ancient religious buildings which may be seen in the valley of Glendalough, at Clonmacnois*, and many other parts of the island, exhibit a species of architecture by no means deformed, and yet differing exceedingly both from the Grecian style of building, and from the Gothic orders which were adopted in Britain.—The few scattered fragments of the Brehon laws, which have been recovered by our ingenious English champion Colonel Vallancey, among many curious particulars respecting the preservation of private property, inflict severe penalties on the person who shall injure his neighbour's trees, every sort of which is enumerated, and even the shrubs and underwood are guarded by sanctions.—It appears from hence, that there was a time when this island was not a kingdom over-run with forests and bogs; when fuel was actually scarce, and
laws

* Built anno dom. 547.—*Vide Sir James Ware.*

laws made to defend it, as the property of individuals*.

THE

* It may not appear unreasonable to date the working of the Ballycastle collieries at such a remote period as this, when, from these laws of the Brehons, one may naturally infer, that wood was by no means a redundant article in Ireland. Though turf has been our common fuel for several years past, yet are there many circumstances which must lead one to imagine that this substance has been entirely generated within these last thousand years, while tillage, and all attention to agriculture, gave place to war and rapine alone. This will not appear surprising to any person who considers that turf bog encreases by a process much resembling vegetation, and that the best land, if neglected, may, from various accidents, very soon be reduced to a state of rank bog. It is indeed next to demonstration that many of the places where turf is cut at present have been once arable land, vestiges of which are discoverable at great depths, and wooden paleings traced many feet under the surface. Even at this day, marks of the plough appear on the summit of several mountains in the North of Ireland, where the great population of that country (which is at present better inhabited than most parts of Europe) has not yet spread itself. The following instance will shew how extensive may be the encrease of bog in a desolate country, even in so short a period as one hundred years.

“ When O'Donnell and Tyrone came to the relief of
 “ Kinsale, they wasted the country as they came through
 “ Connaught,

THE numerous instruments of peace and war, the many curious and costly ornaments of dress*, which are every day dug out of our fields, afford abundant proofs, that the arts once flourished in Ireland, and that the precious metals were not unknown here. Of the latter, many are exquisitely wrought, many of such intrinsic value, as to prove that gold and silver once abounded in Ireland in prodigious quantity†, that there was a time when we had more than the bare necessities

E of

“ Connaught, which by means of the Earl of Clanrickard
 “ was generally loyal; and there is a great tract of ground,
 “ now a bog, which was then plowed land; and there re-
 “ mains the mansion house of my Lord in the midst of it.
 “ If, therefore, want of industry has, in our remembrance,
 “ made one bog, no wonder if a country, famous for
 “ laziness, as Ireland now is, abound with them.”—*Vide*
Letter from Mr. William King to the Dublin Society, written
about the end of the last century.

* See Museum of Trin. Col. Dublin. See Collection of the Royal Irish Academy. See Colonel Vallancey's *Collectanea de reb. Hib.*

† Within the limits of my own knowledge, golden ornaments have been found to the amount of near one thousand pounds in value.

of life, and when poverty did not compel us to pay our taxes in cattle.

THE greater part of these are originals in their kind, unlike to any thing known at present, and of such decided antiquity, that even their uses and purposes can rarely be inferred, by any analogy derived from things in use at this day; tending in the clearest manner to demonstrate, that, the ancient arts and fashions of this island have not been borrowed from our British neighbours, at any time posterior to the Norman conquest.

BUT it is not in architecture, or mere mechanical works alone, that the early Irish seem to have made a tolerable proficiency.—Whoever will take the trouble to consult ancient authors that have treated of this country, may perhaps be satisfied, that it has been, many ages since, the seat of learning and of piety.

THE venerable Bede lived eleven hundred years ago*, and he speaks of it as a rich and happy kingdom, undisturbed by those bloody wars which harraßed the rest of the world during the barbarous ages†;—as a land to which the nobility and gentry of Britain resorted for their education;—as a nation which gratuitously afforded maintenance, books and masters, to all strangers, who came thither for the sake of learning‡.

IT

* Bede was born A. D. 678.

† Insulæ hujus situs est amœnus, ac adversantium exterarum carens bello nationum.—*Bede Vita S. Columbi. cap. i.*

‡ Erant ibidem (in Hiberniâ) multi Nobilium simul et Mediocrum de gente Anglorum, qui relictâ insulâ patriâ, vel Divinæ Lectionis, seu continentioris vitæ gratiâ, eo secesserunt.—Quos omnes Scoti, libentissime suscipientes, victum iis quotidianum sine precio, libros quoque ad legendum, et magisterium gratuitum præberi curabant.—*Bede Hist. Gent. Angl. lib. 3, c. 27.*

“ The Saxons flocked to Ireland as to a great mart for learning—hence we find this expression so often among our writers—such a person was sent over to Ireland to be

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It may perhaps be objected, that the learning of these days was nothing but the musty knowledge

“ educated.—Nor is there any reason to wonder that Ireland, now rude and barbarous, should once have been so full of learning and piety, when the rest of the world was involved in barbarism—for so the wisdom of Providence ordereth it, that a shoot of knowledge may still remain for the good of mankind.”—*Vide Camden's Britannia.*

One should naturally suppose, that the weighty authority of venerable Bede, in the seventh century, supported by the matured judgment of learned Camden, in the sixteenth century, might be esteemed sufficient proof of this plain historical fact,—that, during the barbarous ages, this island was the peaceful seat of literature, to which the inhabitants of Britain resorted for their education. However, as it is a truth, somehow unwillingly received, by men who have been accustomed to maintain a contrary opinion, it may be worth while to add to Bede and Camden a few additional witnesses, equally competent to bear evidence, and equally unexceptionable in the fairness of their testimony.

A letter of the seventh century is still preserved, written by a British author, Aldhelm, to his friend Eafid, just returned from Ireland, whither he had been sent for his education. In this letter, Aldhelm appears hurt at the superior literary reputation of that kingdom; and after bearing honourable testimony in its favour, at length exclaims with
impatience

knowledge of a monastery, and its boasted piety little else than the rank superstition of the

impatience—"But why should Ireland, to which students " sail from hence in such prodigious numbers, enjoy this " extraordinary privilege, as if, in the fruitful soil of Britain, Græcian and Roman masters could no where be " found." "Cur (inquam) Hibernia quo catervatim ex- " hinc lectores classibus advecti confluunt, ineffabili quodam " privilegio efferatur? ac si istic, sacundo Britannicæ in " Cespite, Didascali Argivi, Quirites, reperiri minime " queant."—*Epist. Aldhelmi ad Eafridum, A. D. 690.*—*See Sylloge Epist. Hib.*

William of Malmesbury, (an English writer of the year 1130) speaking of Alfred, King of the Northumbrians, asserts, in the clearest terms, that he went to Ireland, where, in the midst of literary ease and quiet, he was instructed in every species of philosophy. "In Hiberniam siquidem " secedens, (ibiq magno otio literis imbutus) omni Philosophiâ " composuerat animum." *Gulielmus Malmesburiensis, l. 1, de Gest. Angl.*

Toward the latter end of the seventh century, attempts were made to convert the northern Germans to Christianity; and, "among the twelve persons sent on the German mission, the most famous was Wellebrod, born of " Saxon parents in Northumberland, but *who had pursued his studies in Ireland.* For religion, and the liberal " sciences, flourished so much, at that time, in this latter isle, " that

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the church of Rome. Much, however, may be said to invalidate these objections.

IN a country where astronomy was successfully cultivated; from whose schools Virgilius went forth, many ages before the days of Copernicus, to teach the true system of the earth, amid the cavils of an unenlightened world; in such a kingdom, it can hardly be said with propriety, that science was totally neglected*.

WHERE the Roman, the Greek, and Eastern languages were generally studied; where individuals could be found, who had braved the dangers of a voyage to Athens, the native seat of literary elegance; where the
ignorance

*“ that the English went thither in great numbers for their
“ education.”—See Mascou’s Hist. of the ancient Germans,
l. 15, Section 24.*

* See account of Virgilius in Mascou’s Hist. of ancient Germans—in Pope Zachary’s Epist. &c. &c.—See Letter V. of this work.

ignorance of the continental clergy, even in their Latin tongue, was held up as a subject of ridicule; one must conclude that literature was not there entirely disregarded, that something more than mere missals and monkish legends must have been read among such a people*.

THOSE talents, and that learning which, in a humiliating situation, could procure to Albin and Clement the patronage of Charles the Great, and induced that illustrious prince, the reviver of letters in France, to place his favoured universities of Paris and Pavia, under the care of two friendless and unprotected natives of a distant island: that daring and acute genius, supported by science and literature, which extorted encomiums even from the enemies of Erigena; which procured for him the confidence and friendship
of

* See works of Sedulius—Spelman's account of John Erigena, in life of King Alfred—Account of first breach between Boniface and Virgilius, &c. &c.

of Charles the Bald of France, and finally raised him to the honourable station of preceptor to Alfred the Great of England*; such abilities, and such learning, cannot easily be depreciated, without depressing, at the same time, the judgment and character of these illustrious princes, far below the standard by which they have hitherto been classed in the page of history.

CIRCUMSTANCES and evidences such as these, seem to afford the clearest testimony, that *science* and *literature* were not neglected in Ireland, at this early period; and whoever will consult the works of Archbishop Usher, may be satisfied, that superstition was by no means the prevailing character of its religion.

THAT

* Johannes Erigena, Hibernus, &c.—vir ingenio præacuto, singulari doctrina (pro capto seculi quod agebat) cum artium, tum linguarum, præsertim Græcæ, Chaldaicæ, et Arabicæ, &c.—*Ælfredi magni Vita*, l. 2, p. 99. *Oxonii*, 1688.—*See also Character of Erigena in Mosheim's Eccles. Hist.*

THAT excellent and learned author has clearly demonstrated, that the supremacy of Rome was unknown to the ancient Irish; that the worship of saints and images was held in abhorrence, and no ceremonies used which were not strictly warranted by scripture; that all descriptions of people were allowed, and desired, to consult the sacred writings as their only rule of conduct; and from the passages quoted by their teachers, it appears, that they read the *original*, as their proper authority, and often corrected the Latin text*.—In short, from the evidence produced by this learned and faithful writer, we have the strongest reason to conclude that this island enjoyed the blessings of a pure and enlightened piety, such as our Saviour himself taught, unembarrassed by any of the idle tenets of the Romish church; and that it is to the English invaders of the twelfth century we are chiefly indebted for the establishment of a religion which

* See a curious treatise of Archbishop Usher on the religion of the ancient Irish,

which has deluged the kingdom with blood, and been the great source of almost all its calamities.

I FEAR you may be ready to start at this, as a paradox too wild, and too novel, to gain credit.—Accuse the protestant kingdom of England of introducing popery, with all its attendant train of miseries, into Ireland? and applaud the Irish as the genuine votaries of the reformed religion?—Yet, methinks, when we cast our eyes on King Henry the second, advancing toward this devoted nation, bearing in one hand the bloody sword of war, and in the other the iniquitous bull of Pope Adrian, which invested him with unlimited authority to root out heresy, and to extend the empire of Rome*,—we see an irrefragable argument to prove that this was not originally an island of popish

* To Ireland also by King Henry (Le Fitz
Of Maude, daughter of first Henry)
That conquered it for their great heresy.

Vide Harding's Chron. c. 241.

popish saints, and that the jurisdiction of Rome was not *unquestionably* established here; since it does by no means accord with the principles of that court, to sacrifice its obsequious votaries to the ambition of a proud prince, who seemed but ill suited to accommodate himself implicitly to the papal authority.

IN fine, many and unequivocal circumstances concur, to prove, that, during the barbarous ages, when the rest of Europe was involved in all the horrors of bloodshed, ignorance and superstition, this sequestered island enjoyed the blessings of peace, of learning, and of a pure religion, and was literally the happy country described in the following lines by St. Donatus, a bishop of Etruria, who died in the year 840.

“ Far westward lies an isle of ancient fame,
 “ By nature blest’d, and *Scotia** is her name;
 “ An

* The ancient name of Ireland.—*Vide Bede and others in many places. See Letter V. page 90, of this work.*

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“ An island rich—exhaustless is her store
 “ Of veiny silver and of golden ore* ;
 “ Her fruitful soil for ever teems with wealth,
 “ With gems † her waters, and her air with
 “ health.

“ Her verdant fields with milk and honey
 “ flow,
 “ Her woolly fleeces vie with virgin snow ;
 “ Her waving furrows float with bearded corn,
 “ And arms and arts her envy'd fons adorn.

“ No savage bear with lawless fury roves,
 “ No rav'ning lion thro' her sacred groves,
 “ No poison there infects, no scaly snake
 “ Creeps thro' the grafs, nor frog annoys the
 “ lake.

“ An

* Gold has been found in the counties of Wicklow, and Londonderry.—See *Boates's Nat. Hist.*

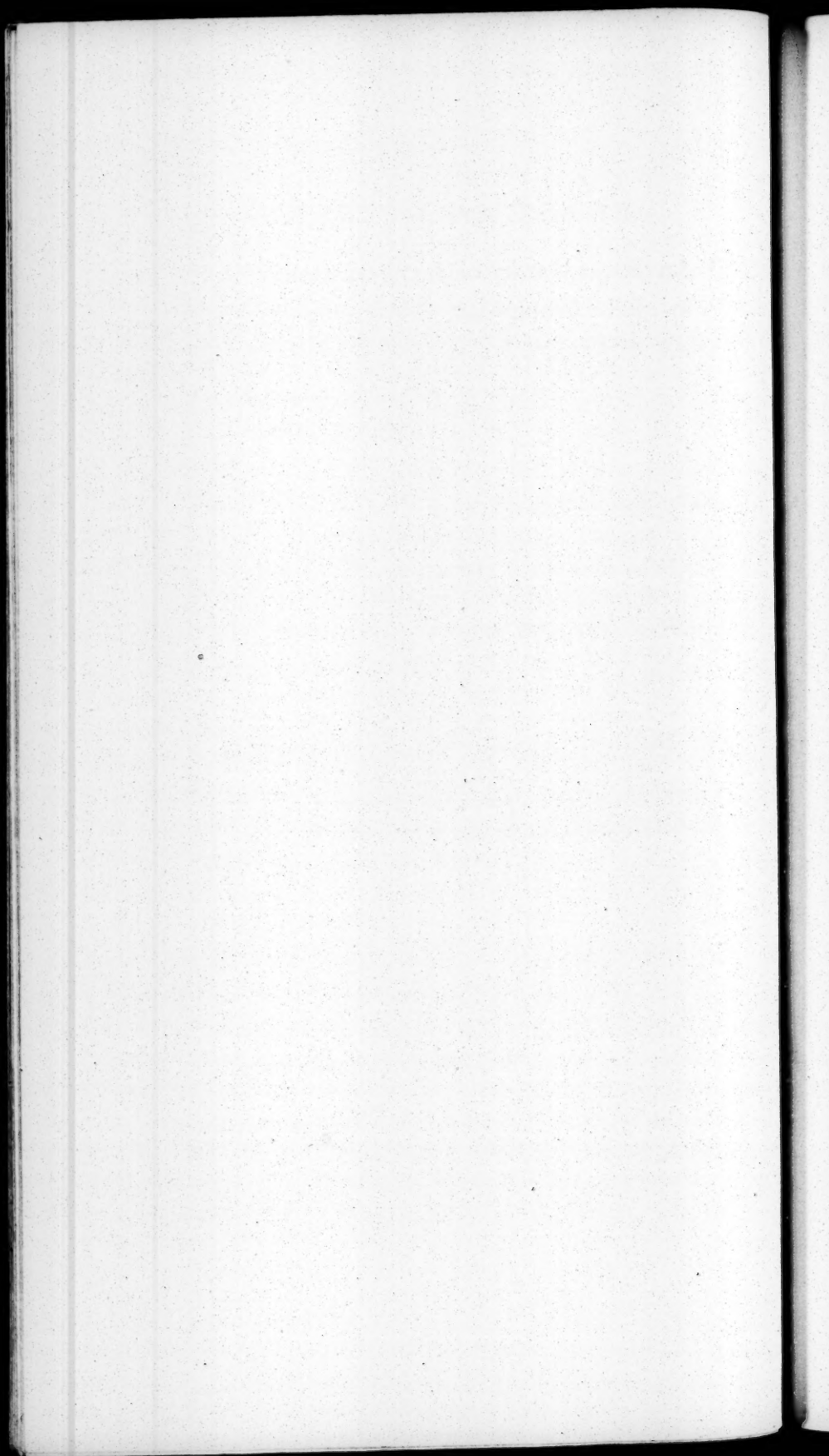
† Pearls are still found in many rivers of Ireland, some of them very valuable.—See *Museum of Trin. Coll. Dub.*
 —See an *Account of the Pearl Fishery of Ireland*, by Sir Robert Reding.

“ An island worthy of its pious race,
 “ In war triumphant, and unmatched in
 “ peace*.”

I remain your's.

* Finibus occiduis describitur optima tellus,
 Nomine, et antiquis *Scotia* scripta libris.
Insula dives opum, gemmarum, vestis, et auri;
 Commoda corporibus aere, sole, solo.
Melle fluit, pulchris et lacteis *Scotia* campis,
 Vestibus atque armis, frugibus, arte, viris.
Urforum rabies nulla est ibi; fæva *Leonum*
 Semina nec unquam *Scotica* terra tulit.
 Nulla venena nocent, nec *Serpens* serpit in herba;
 Nec conquesta canit garrula *Rana* lacu.
 In qua *Scotorum* gentes habitare merentur,
 Inclyta gens hominum milite, pace, fide.
Vide Hibernia Dominicana, page 8.

LETTER



LETTER V.

DEAR SIR,

THE hesitation with which you seem to acknowledge the spiritual independence of the ancient Irish, and the chaste simplicity of their religion, has induced me to consider, with repeated attention, the reasons which might have influenced my opinion on that subject*.

As

* In the Ecclesiastical Journal of the year 1787, published at Rome, it is asserted, that, " Philosophical Heresie
" in Ireland has adapted facts to its own ideas, instead
" of conforming its ideas to facts, when it affirms, that,
" the faithful and learned Usher has clearly demonstrated,
" that the supremacy of Rome was unknown to the ancient
" Irish :

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As I well know the delight, wherewith you are wont to contemplate the brighter periods which occur in the history of nations, I shall have great satisfaction in laying before you a little abstract of such prominent events, in the annals of the ancient Irish, as seem most likely to decide the general character of the nation, and which depend on authorities that are,

“ Irish :—that the worship of saints and images was held
“ in abhorrence : and that the scriptures were to *all men*
“ the only acknowledged rule of faith.”—See *Giornale Ecclesiastico di Roma*, April 1787.—See letter IV. p. 73, of this work.

If the writer of this Catholick Journal, to whom I am much indebted for his indulgence to the general faults of these letters, wishes to combat my illustrious predecessor in the Protestant University of Dublin, his works lie before the public, and I have little doubt that Archbishop Usher will be found a *Giant indeed* in literature, an antagonist invincible even in Death.

But my own credit, as a faithful writer, has required me to shew that I have not in this instance adopted my opinion, except on the strongest grounds of probability; for which reason this letter is here inserted, though not published in the first edition of this work, as being foreign from the subject.

are, in their own nature, the least questionable.

WHEN the missionaries of christianity first ^{5th Cent.} came into Ireland, the *Roman Catholic Religion* had no existence: there was indeed a bishop of Rome, possessed of uncommon influence and power; but, the peculiar system, whose distinguishing features are, the spiritual supremacy of Rome over all the world, the adoration of saints and images, the belief of transubstantiation in the elements of the Eucharist, and the adoption of numberless opinions and ceremonies, upon other authority than the sacred scriptures,—this system was not yet in existence*.

It is therefore absolutely certain, that Pa-A. D. ladius, Patricius, and their immediate disci-^{430,}
ples, in the beginning of the 5th century, did^{431,}
not introduce into Ireland the *Roman Catholic*
F *Religion* :^{&c.}

* See Mosheim or any other general ecclesiastical historian.—Cent. 4, 5, &c.

5th Cent. *Religion* : but, on the contrary, it is extremely probable, that these early missionaries taught, and maintained, that religion, wherein they themselves had been educated, and for which they had undergone considerable distress and danger.

A. D. TOWARD the close of this century lived the
490. venerable Sedulius*, an ecclesiastic, whose works have fortunately escaped the ruin of time, and barbarian nations.

THIS venerable author, far from distracting the attention, in religious adoration, from the supreme Being, to inferior objects; far from recommending the worship of saints and martyrs, expressly affirms, “ that it is
“ the

* “ Sedulius, vir venerabilis,” is the epithet given to him by the Pontiff Gelasius in the Roman synod.

This Sedulius lived about the year 490, according to Usher, Ware, &c. ; according to the French biographers, who have perhaps confounded him with Sedulius secundus, he lived in the 7th century.—But all parties agree that he was an Irish ecclesiastic, and that the works usually attributed to him are authentic.

“ the crime of impiety to adore any other 5th Cent.
 “ besides the Father, Son and Holy Spi-
 “ rit *.”

IN terms almost adapted to the warm language
 of the reformation, he shews, “ how great”
 “ they have erred, who, supposing that the
 “ invisible God could be worshipped through
 “ a visible form, have changed the glory of
 “ an incorruptible being into an image made
 “ like to corruptible man.—Senseless! not to
 “ perceive that there can be no similitude be-
 “ tween what is lifeless, and that which
 “ is immortal; thus offering to idols, the
 “ attributes and honour due only to the
 “ Almighty; setting themselves at a distance
 “ from the Lord of Life, and abiding only
 “ by that which is dead:—for surely God
 F 2 “ cannot

* “ Breviter, et omni in unum collectâ definitione,
 “ adorare aliâ prater patrem, filium, & spiritum sanc-
 “ tum impietatis est crimen.”—*Vide Seditii Scoti Hibernensis*
in omnes Epistolas Pauli Collectaneum. Basilæ, A. D.
 1528.

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5th Cent. "cannot be known in images of stone or
"metal*."

At the time wherein Sedulius lived, a Latin translation of the scriptures had been adopted in the church of Rome †; which in later times assumed the form of the vulgate translation, and finally received the solemn approbation of the Roman Pontiff, Sixtus V. How little this unprejudiced commentator valued the example and authority of Rome, in comparison of the weightier consideration of truth and reason, may easily be known from his frequent censures

* Non intelligentes nullam similitudinem habere mortuum immortalis, nomen et honorem Dei idolis dederunt; a vivo enim Deo recedentes, mortuis favent.—Nomen Dei dederunt iis qui non sunt Dei, lapidibus (sc.) et lignis atque Metallis; sed Deus non cognoscitur vel in lapide vel ligno, &c.—*Vide Sedulii Com. in Epist. ad Rom. passim.*

† Authores Ecclesiastici, ab hinc mille annis, solâ vulgatâ versione usi sunt, solam commentati sunt, et vigiliis suis illustrarunt; cæteræ omnes versiones vel a Catholicâ Ecclesiâ exterminantur, vel in tenebris delitescunt.—*See Edition of Pope Sixtus V. bible, Paris, A. D. 1528.*

fures of the Latin translation, and his repeated 5th Cent. advice, that we should rather “consult the “Hebrew and Greek verity*.”

IN the succeeding age lived Columbus, the 6th Cent. celebrated missionary of Ireland to the western A. D. 560. islands of North Britain; and we have the authority of venerable Bede to warrant us in saying, that, in his days, the scripture was the only fountain from whence religious duties were immediately derived.—“That Columbus “and his disciples observed *only* those works “of piety, and chastity, which they could “learn in the prophetical, evangelical, and “apostolical writings†.”

AT

* In the old Testament he recommends to us—“*Hebraicam Veritatem.*”—*Usher.*—In his observations on the new Testament these expressions often occur—“*In Græco melius Habet, verius apud Græcos*”—“*male legitur in Latinis Codi cibus.*”—(*Vide Sedulii Com : passim.*)

† Reliquit successores *santum* ea quæ propheticis, evangelicis, & apostolicis literis discere poterant, pietatis et castitatis opera diligenter observantes.—*Bede Hist. Eccles. lib. 3. c. 4.*

7th Cent. AT no long interval after these primitive
 A. D. teachers, lived the pious bishop Aidan, whose
 630. virtues and moderation procured him an honourable mission from his countrymen to Oswald king of Northumberland, who wished to have his subjects instructed in the christian religion.

IN his unassuming age, we have reason to believe, that, no mysterious veil was drawn between the people and the sacred writings; but, on the contrary, we are told, “that
 “all such as went in Aidan’s company,
 “whether of the clergy or laity, were *required* to exercise themselves in reading the
 “scriptures *.”

ABOUT this period, the ecclesiastics of Ireland supported a bold and open controversy with the see of Rome, concerning the time of celebrating the festival of Easter.

How

* Omnes qui cum eo incedebant, sive Adtonsi, sive Laici, aut legendis scripturis, aut psalmis discendis operam dare deberent.—*Bede Hist. Eccles.* lib. 3. c. 4.

How unconscious they were of Roman 7th *Cent.* chains, how little they were influenced even by Roman example and advice, may best be known from the ineffectual prayer of the sovereign Pontiff Honorius, " Let not A. D. " so small a nation, situated in such a re-^{632.} " mote corner of the earth, let it not, I " entreat, thus set up its own wisdom, " above that of the universal christian " church, and the decrees of Roman sy- " nods *."

EVEN in the amiable and gentle character of Aidan, the missionary from Ireland to the Northumbrians, we see this national spirit of religious independence, and opposition to the church of Rome, expressed in terms exceedingly

* Exhortans (sc. papa Honorius) ne paucitatem suam in extremis terræ finibus constitutam, sapientiore antiquis sive modernis, quæ per orbem terræ erant, Christi Ecclesiis estimarent: neve contra Paschales Computos, & decreta synodalia totius orbis Pontificum, aliud pascha celebrarent.—*See Bede*, l. 2. c. 19.

7th Cent. ingly strong, by Bede himself, the champion of Romish tyranny.

“ AIDAN (says that author) was a man
 “ of uncommon gentleness, modesty and
 “ piety: the messenger of peace, charity,
 “ continence, humility; and superior to the
 “ passions of anger, avarice, insolence or va-
 “ nity. These things I praise as valuable in the
 “ fight of heaven,—but that he refused to cele-
 “ brate the festival of Easter according to the
 “ Romish canon, either from want of know-
 “ ledge of it, or overcome by the *authority of*
 “ *his nation*, this I cannot praise, but must
 “ detest and condemn *.”

To Aidan, succeeded Colman, in his mission to the northern parts of England; “ and the
 “ place

* Quod autem Pascha non suo tempore observabat, vel canonicum ejus tempus ignorans, vel *sue gentis auctoritate* ne agnitum sequeretur devictus, non approbo nec laudo, &c.
 —Vide Bed. Hist. Gent. Angl. l. iii. c. 3, 14.

“ place chosen for the dispute which he was 7th Cent.
 “ sent to maintain, concerning the festival of
 “ Easter, was a religious house in Yorkshire,
 “ whereof Hilda was abbess; which was the
 “ more grateful to Colman, because that
 “ lady (a learned and devout woman)
 “ was a *professed enemy to all the rites of*
 “ *Rome* *.”

HENCE it appears, that in this age, the na- 660.
 tional church of Ireland stood forward, as an
 antagonist against the encroachments of Rome;
 and had secured a strong party, even among
 the Britons, at this early period, in favour of
 its heresies.

IN the same century lived Oswy king of
 Northumberland, into whose dominions the
 christian religion had been introduced by the
 missionaries of Ireland; and venerable Bede,
 the

* See Spotswood's *Church History*.

7th Cent. the friend of Rome, informs us, that, this religion was *not* the Romish religion, since
 “ Ofwy, *although* educated in the Scottish,
 “ (*i. e.* the *Irish church*) yet understood the
 “ Roman to be the catholic and apostolic
 “ church *.”

ABOUT

* Intellexerat veraciter, *quoniam* educatus a *Scotis*, quia *Romana* esset Catholica et Apostolica Ecclesia.—
See Bede.

As the name of Scotia is, at present, peculiarly applied to North Britain, it may perhaps be necessary to mention that this was the original name of *Ireland alone*, whose inhabitants were called *Scoti*: In consequence of colonizations from Ireland into North Britain, the latter country became known by the name of Scotia Minor, and the respective inhabitants were then Scots of Ireland, or Scots of Albany. At length, *Scotland* became the appropriated name of North Britain.

I shall quote a few credible authorities in different ages, to prove that Hibernia and Scotia were synonymous: Whoever wishes for more ample information (if it can be thought necessary) may find it in the last edition of Sir James Ware's *Antiquities of Ireland*.

“ *Scotorum*

COAST OF ANTRIM. 91

ABOUT the middle of the eighth century, ^{8th Cent.}
 Virgilius, an ecclesiastic, a native of Ireland, ^{A.D.}
 741.
 taught

“ Scotorum Cumulos flevit glacialis Ierne.” ^{4th Cent.}
Claudian.

“ Hibernia a Scotorum gentibus Colitur.”
Ethicus the Cosmog.—See Ware.

“ Hæc insula propior Britannæ, &c. Colitur a Scotis.”
Paulus Orosius.

“ Gens Scotorum incolit Hiberniam.” ^{7th Cent.}
Bede, Vit. Sanct. Columb.

“ Hibernia dives Lactis et Mellis insula, nec vinearum
 “ expers, &c. Hæc proprie patria Scotorum est.”
Bede, Hist. Gent. Anglicanz.

“ Scotia ^{9th Cent.}
 “ Insula dives opum, gemmarum, vestis, et auri.”
Poema Sanct. Donati.

“ Ireland that we Scotland call.”
Alfred's Translation of Orosius.—See Ware.

“ Scotiam quoque partem Insulæ Britannæ dictam esse ^{12th Cent.}
 “ aquilonarem, quia gens Scotorum originaliter ab his
 “ propagata (sc. ab Scotis Hiberniæ) terram illam habi-
 “ tare dignoscitur.”
Girald. Camb. Topog. Hibern.

“ Scoti omnes Hiberniæ habitatores initio vocabantur.” ^{17th Cent.}
Buchanan. Historia Rerum Scotticarum.

92 LETTERS CONCERNING THE

8th Cent. taught on the continent the true figure of the world, maintaining that the earth was spherical, that many parts of it were yet undiscovered, and that each nation had its respective antipodes.

How ill this truth was adapted either to the religion or philosophy of Italy, in that barbarous age, may best be inferred from the angry and ignorant epistle of the Roman Pontiff Zachary, to Boniface, afterward his successor in the papal chair.—“ If (says he) it be
 “ proved, that, Virgilius hath advanced this
 “ impious and perverse doctrine, that there
 “ exists another world, and other men under
 “ the earth, deprive him of his priesthood,
 “ expel him from the church*.”

How

* De perversâ autem et iniquâ doctrinâ, quam, contra Deum et animam suam locutus est, si clarificatum fuerit, ita eum confiteri, quod alius mundus, et alii homines sub terrâ sint, hunc, accito concilio, ab Ecclesiâ pelle, sacerdotis honore privatum.—*Vide Usher Syll. Epist. Hib.*—*See Ware's Irish Writers.*—*See Masceou's Hist. Ancient Germans.*

How nobly does the manly and ingenuous 8th *Cent.* conduct of Virgilius, this early son of science, contrast with the more timid and accommodating behaviour of venerable Bede! The former, born in a country of spiritual liberty and independence, dared boldly to avow the cause of truth and reason wherein he had been educated from his infancy; while Bede, the fond admirer of Irish literature, had indeed learned the true theory of the earth, but bending to the servitude of Rome, he offered up his trembling sacrifice of homage and obedience, by acknowledging his belief, that the world was not inhabited through the whole circumference, because there was no proof of it*: thus preserving to the spiritual sovereign of the church, his assumed dominion over all the nations of the earth.

OF the religious independence and enlightened state of Ireland during this age, as contrasted with the spiritual slavery and ignorance

* See Masfou's *Hist. of the Ancient Germans*, l. 16. c. 26.

8th *Cent.* ignorance of the rest of Europe, we have an interesting picture, delineated by the pen of the learned Mosheim, a German writer.

“ THE labours and industry of the divines of this age” (says that respectable author) “ were totally employed in collecting the opinions and authorities of the theological writers of the first six centuries: and so blind and servile was their veneration for these men, that they regarded their dictates as infallible, and their writings as the boundaries of truth, beyond which reason was not permitted to push its researches.

“ THE Irish, who in this century were known by the name of Scots, were the only divines who refused to dishonour their reason, by submitting it implicitly to the dictates of authority. Naturally subtle and sagacious, they applied their philosophy, such as it was, to the illustration of the truths and doctrines of religion; “ a method

“ a method almost generally abhorred and 8th Cent.
 “ exploded amongst all other nations.

“ THAT the Irish were lovers of learning;
 “ that they distinguished themselves in these
 “ times of ignorance, by the culture of the
 “ sciences, beyond all the other European
 “ nations, travelling through the most distant
 “ lands with a view to improve and to com-
 “ municate their knowledge, is a fact with
 “ which I have been long acquainted, and
 “ is derived from the most authentic records
 “ of antiquity*.”

In the middle of the ninth century, the por- 9th Cent.
 tentious doctrine of transubstantiation was for- A. D.
 mally avowed by the church of Rome†, 845.
 wherein the faithful were required to believe,
 that, actual flesh and blood occupied the place
 and form of visible bread and wine, in the
 elements of the Eucharist.

AGAINST

* See Mosheim's *Ecclef. Hist.* Cent. 8.

† See Mosheim's *Ecclef. Hist.* Cent. 9.

9th Cent. AGAINST this outrage upon reason, Johannes Erigena (John of Ireland) pointed his witty and eloquent pen, ably supporting the evidence of his grosser natural senses, in opposition to the spiritual sense of Rome; and clearly demonstrated, that the sacraments of the altar were not to be esteemed the real body and blood of Christ, but only a commemoration of them *.

THIS adventurous author soon after had the boldness to translate, and even to dedicate to his patron Charles the Bald, a Greek work, which had been censured by the court of Rome. This offence, aggravated by the vigorous and inflexible spirit wherewith he had opposed the mysterious principle of transubstantiation, at length brought down on his devoted head the vengeance of the sovereign arbiter of religious opinions, from which even the power of his royal patron could not protect

* See Ware's *Writers of Ireland*.—See Mosheim's *Eccles. Hist. Cent. 9*.—See Dupin's *Eccles. Hist.*

test him*. Erigena was obliged to fly from the 9th Cent. court of France to his native island, the safe
 asylum

* "One John of the Scots nation has translated the work of Dionysius the Areopagite, which should have been sent to me, and approved of by my judgment, especially as said John, though a man of *excellent learning*, is suspected not to be orthodox; for which reason your majesty will please to send both the book and its author to Rome."—*Pope Nicholas's letter to Charles II. of France.*—See *Spotswood's Church Hist.* l. 2.

John Erigena is described, by the author of the life of king Alfred, as a man highly celebrated for wit, acuteness of understanding, and uncommon knowledge in the sciences and languages known in that age; particularly, for an extraordinary acquaintance with the Greek, Hebrew and Arabick tongues; he had the honour of being the intimate friend and companion of Charles the Bald of France, so long as the court of Rome permitted that prince to be the protector of wit and learning; and to him, the celebrated king Alfred, the preserver of his country, the reviver of English literature, and reputed father of the university of Oxford, is said to have been indebted for his liberal and uncommon education.

Johanes Erigena, Hibernus, *Scoti nomine notior*, &c.—*Vir ingenio præacuto, singulari doctrinâ, &c.; Summæ ex-istimationis habebatur apud Carolum Calvum, &c. Postmodum ab Ælfrido Rege sollicitatus, in Angliam trajecit, ubi ipsi regi præcepit, tum in linguis, tum in artibus.*—*Ælfridi Magni vita*, l. 2. p. 99, &c.—*A Joh. Spelman, Oxonii, 1688.*—See also *Hoveden's Annals*.

9th Cent. asylum from Roman tyranny, where he died in the year 874*.

FROM circumstances such as these it came to pass, that, amid the general gloom, which, at this inauspicious period, brooded over the face of Europe, and rapidly descended on the Italian capital, the Roman Pontiff, seated as he was upon his throne of darkness, often shrunk back in terror, appalled by these radiant beams, which, contrary to the course of nature, darted from the western hemisphere, threatening an immediate dawn; and under the influence of his terrors we may hear him exclaim, in repeated charges to his clergy, “be-ware of Britons, heretics†.”

At

* See Dupin, Cent. 9.—Numberless other instances, equally decisive with those already mentioned, might be effectually adduced as evidences of the spiritual independence of Ireland, and the apostolical simplicity of its religion, antecedent to the 10th century: but they are here omitted for sake of brevity, and as unnecessary toward the further illustration of a subject, only casually examined in these letters.

† “Gentilitatis ritum & doctrinam, vel *venientium Britonum*, “&c. abjiciatis.”—*Introduc. Epist. Greg. ad Bonifac.*

The

AT the unhallowed close of the ninth cen-^{10th Cent.}
 tury, when the bloody weapons of barbarian ^{A.D.}
 invaders had effectually supported the spiritual ^{900.}
 arms of Rome, and spread universal ruin and
 distress over the land; when public seminaries
 were overthrown, their peaceable inhabitants
 butchered, and learning and religion in *an in-*
stant extinguished*; the people of this un-
 happy island, rapidly hurried from meridian
 splendor into the darkness of midnight, expe-
 rienced a degree of ignorance and misery far
 surpassing even the wretchedness of savage
 life.

ATTENTIVE only to tales of blood and ^{10th, 11th,}
 rapine, anxiously doubtful from whence the ^{12th Cent.}
 hasty stroke of death might fall, and wan-

G 2

dering

The term Briton must here be supposed to apply to mis-
 sionaries who went either from Ireland itself, into Germany,
 through Britain, or else from the *Irish church* established at
 that time in the northern parts of Britain, for the British
 themselves, (properly so called) were at this period almost
 swallowed up by the Saxons, the Picts, and the Scots of
 Ireland—and indeed no part of that kingdom stood at bay
 with the church of Rome except that which was under the
 immediate influence of Ireland.

* See page 56 of these Letters.

10th, 11th, dering amid the illusive suggestions of intel-
 12th Cent. lectual obscurity, like infants, they became
 terrified at phantoms of their own creation.

THIS æra, perversely fruitful in unnatu-
 ral births, teemed with tumultuary hosts of
 saints, and images, and demons; with purga-
 tories, miracles, penance; with every monster
 that can be supposed to flourish under the
 anarchy of ignorance: until, at length, the
 A.D. victorious arms of Henry II. supported by the
 1170. thunder of Rome, finally enthroned the
 Roman Pontiff, and in reality benefited the
 kingdom, by substituting spiritual order and
 system, in the place of more vague and de-
 fultory superstition †.

It would be cruel to wound your benevolent
 heart, by an unprofitable pursuit of learning
 and

† The king Henry then, conquered all Ireland
 By Papal doom, thereof his royalty,
 The profits and revenues of the land,
 The domination and the sovereignty;
 For error, *which, again the spirituality*
They held full long, and would not been correct
Of Heresies, with which they were infect.

Harding's Chron.

and religion, during the long night which succeeded the portentous eclipse of the ninth century; when reason was utterly dethroned, when all the milder and more exalted virtues had fled away in terror, giving place only to the convulsive struggles of excited savage nature, and the degrading inventions of superstitious frenzy.

If you wish to study the history of this country without painful sensations, I must entreat that you will fly to the most distant period of antiquity, to the early days when Ireland was yet in infancy, when eastern nations, deserting their rich Asiatic climates, were borne to her more temperate soil: Attend them from thence into the æra of more sober history, when matured reason had established a national character for literature, and when the chaste and gentle precepts of christianity had excited the genuine spirit of devotion: Follow them to the brink of barbarism, and weep over the untimely grave of learning and religion,—but step not beyond the ninth century, for there ancient Ireland lies prostrate.

AT

AT the close of the eighteenth century, a vigorous infant nation has started up from the blood of its murdered parent, whose undiffembling heart exults with all the luxuriant gayety of hope. On this object I am persuaded that your patriot affections will dwell with the most sincere pleasure; here then will I leave you, and close this long letter, which I have been compelled to write in my own defence. However, my trouble, in this instance, will be amply recompensed, should you approve of the evidence I have here laid before you, in support of the ancient religious independence of this country. To a large part of the world this evidence should seem to be *infallible*, resting on no less authority than the Roman Pontiff himself, and the almost equal credibility of venerable Bede, the friend of Rome. But I am well aware that you possess so inflexible a predilection for truth, so little value for mere authority, in short, I know you to have so much of the *ancient Irishman* about you, that the sovereign Pontiff's Honorius, Zachary, Nicholas, Adrian, the venerable Bede,

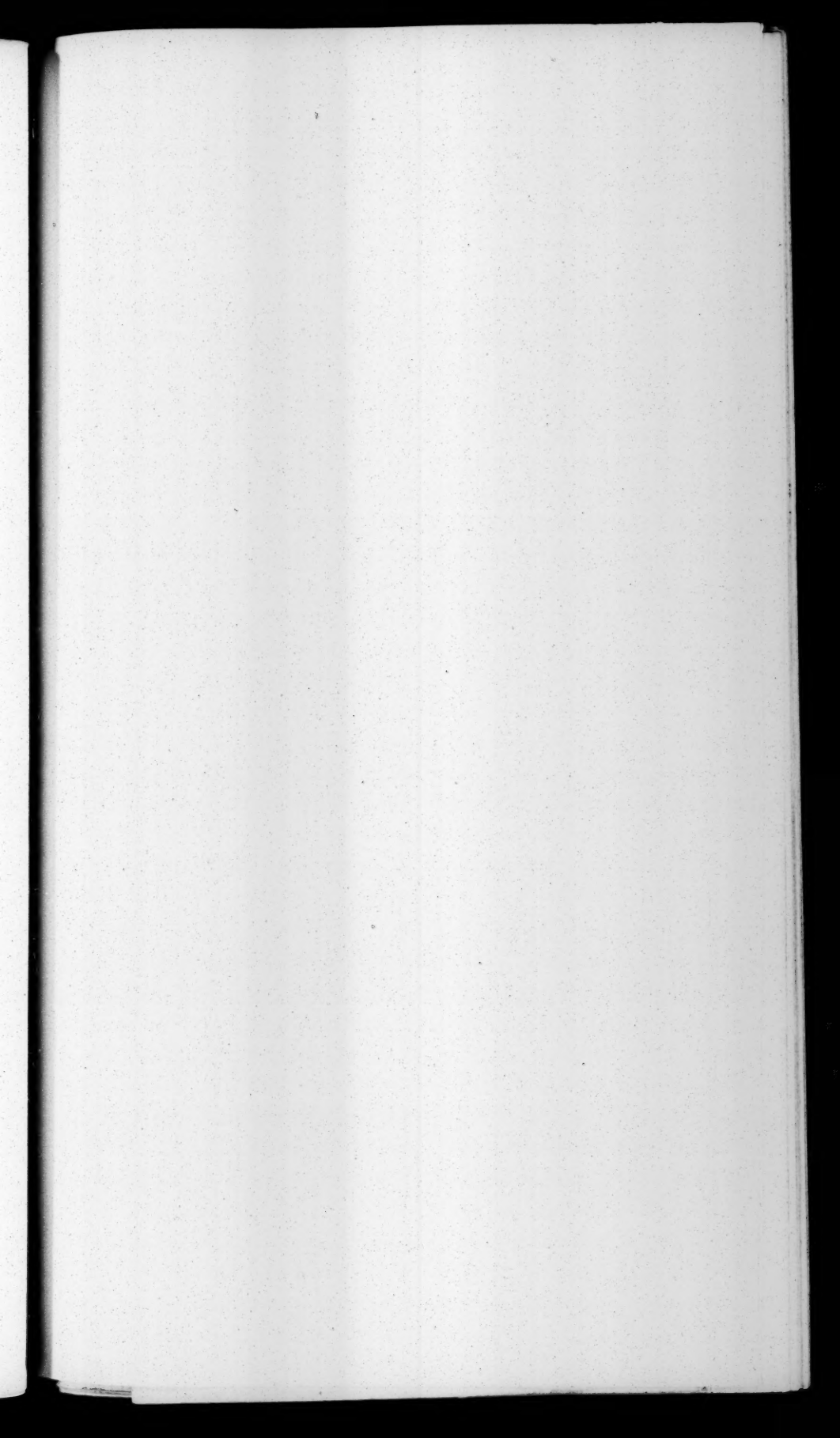
or

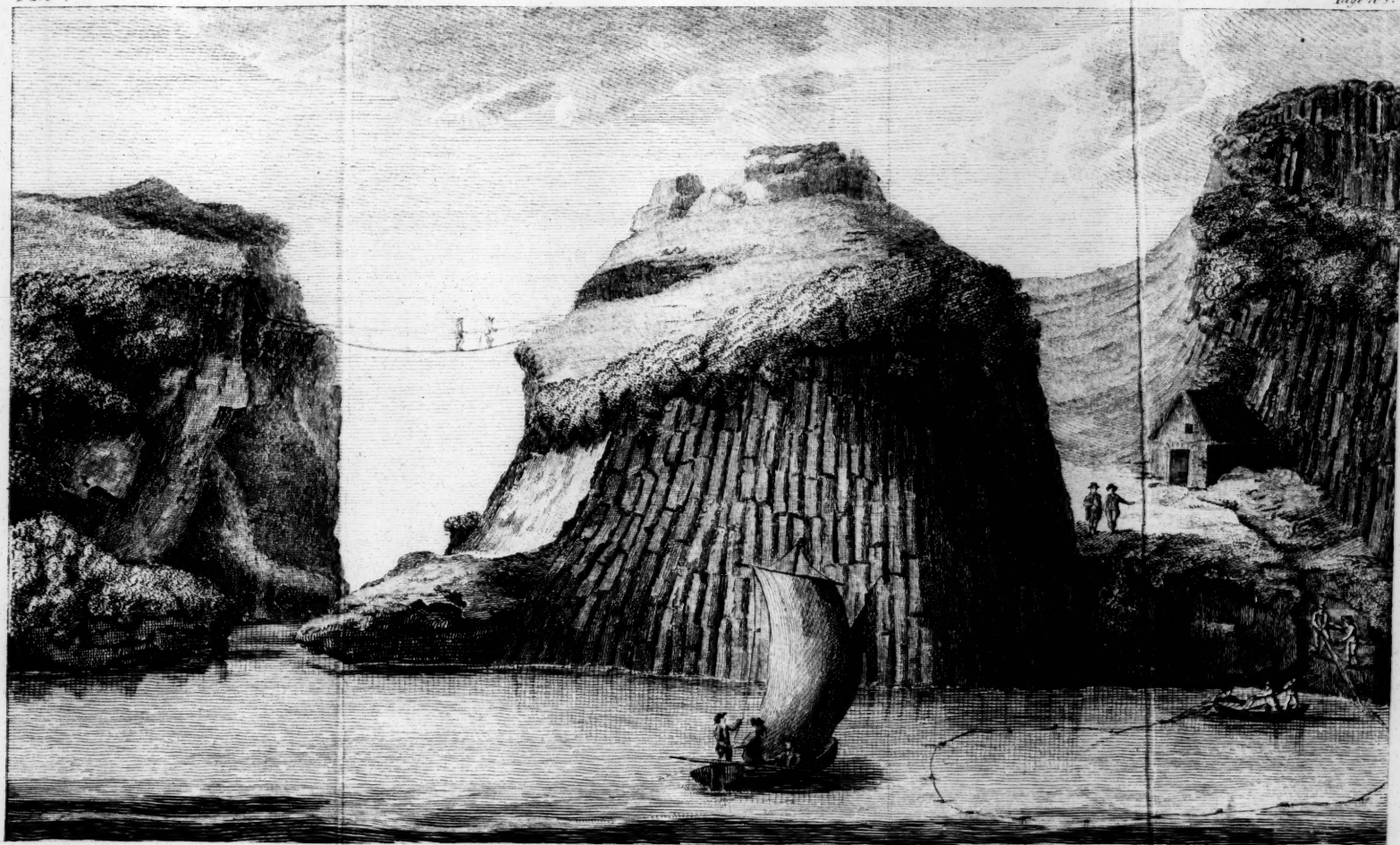
or any other respectable witness who may draw upon you for credit, will, in vain, claim from you more than an equivalent to the value of what he may have fairly deposited in your hands.

I remain your's.

LETTER

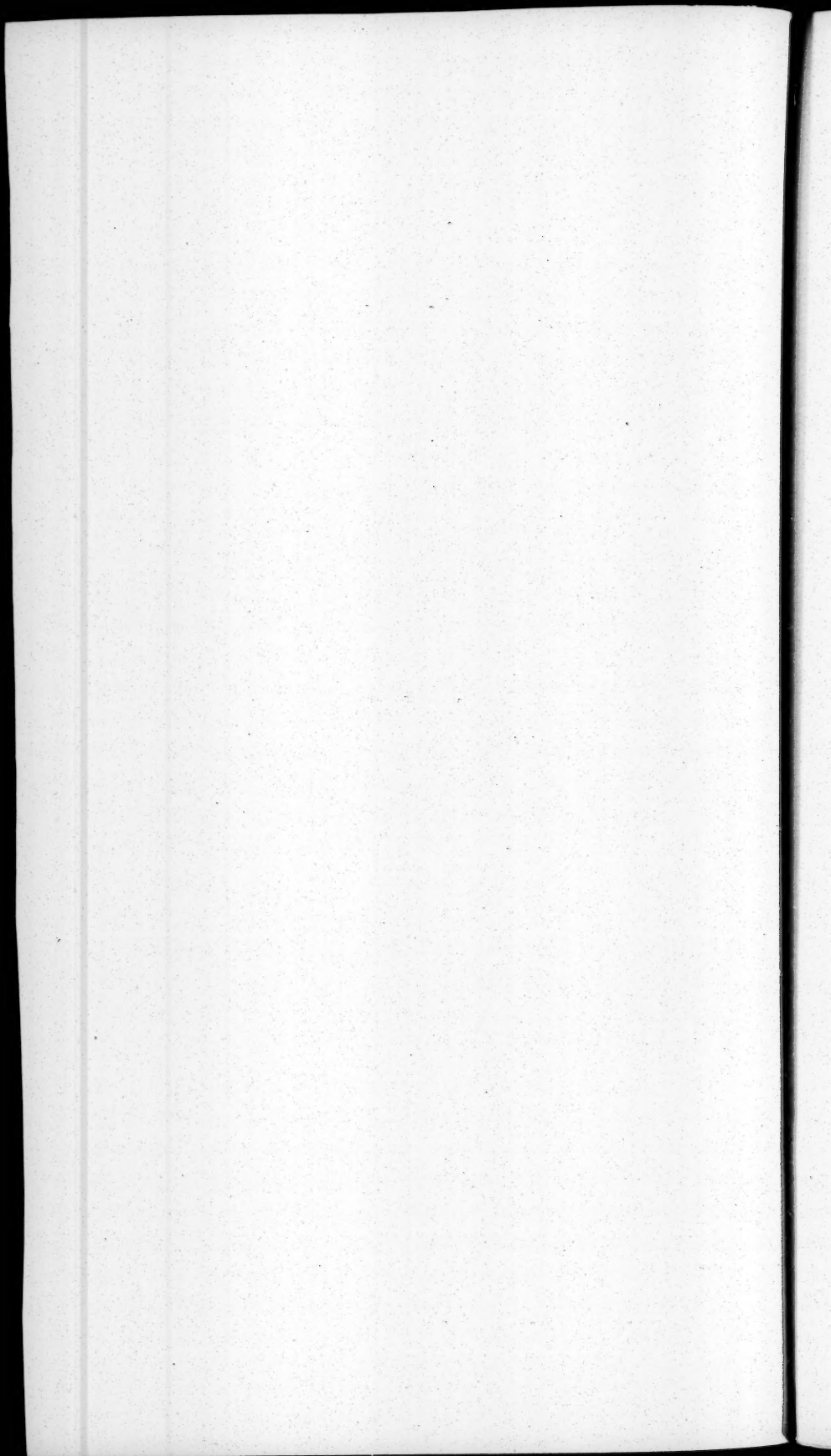






J. Ward Sculp.

Basaltic Island of CARRIG a RAMHAD on the Coast of Antrim, connected to the Continent by a Bridge of Ropes 60 Feet in length, over a Chasm 84 Feet in depth.



LETTER VI.

Portrush, August 3, 1784.

DEAR SIR,

IN riding from Ballycastle to Portrush, I went a short way off the beaten road, to see a whimsical little fishing rock, connected to the main land by a very extraordinary flying bridge; it is called Carrick-a-rede*, (or the rock in the road) and lies somewhat eastward from Ballintoy, on an abrupt and romantic shore.

I WAS

* *Caraig a Rambad—The Rock in the Road.* In these Letters the names of places are written according to the manner in which they are at this day usually pronounced; but the original orthography is generally very different.

I WAS quite delighted with the picturesque appearance of this fanciful fishery, of which I must beg leave to give you a short account: However, as I am a great advocate in favour of Mr. Locke's system of a dictionary of pictures, in preference to a dictionary of tedious descriptions, I shall enclose you a drawing of Carrick-a-rede, from a sketch which my draftsman made on the spot.

AT a particular season of the year, the salmon come along the coast in quest of the different rivers in which they annually cast their spawn.—In this expedition the fish generally swim pretty close to the shore, that they may not miss their port; and the fishermen, who are well aware of this coasting voyage of the salmon, take care to project their nets at such places as may be most convenient for intercepting them in their course.

IT so happens that Carrick-a-rede is the only place on this abrupt coast which is suited for the purpose.—Here then or no where
must

must be the fishery—but how to get at the rock is the question.—A chasm full sixty feet in breadth, and of a depth frightful to look at, separates it from the adjacent land; at the bottom of this the sea usually breaks with an uninterrupted roar among the rocks: the island itself is inaccessible on every side except one spot, where, under the shelter of an impending rock, a luxuriant herbage flourishes, and a fisherman's little cot is built; but the wildness of the coast, and the turbulence of the sea, make it difficult to land here, unless the weather be extremely calm.

IN this perplexity there is really no resource, except in attempting to throw a bridge of ropes from the main land to the island; which accordingly the fishermen every year accomplish in a very singular manner*. Two strong cables are extended across the
 gulph

* This bridge is only thrown across during the time of the salmon fishery, which is carried on in the summer months.

gulf by an expert climber, and fastened firmly into iron rings, mortised into the rock on either side. Between these ropes a number of boards, about a foot in breadth, are laid in succession, supported at intervals by cross cords; and thus the pathway is formed, which, though broad enough to bear a man's foot with tolerable convenience, does by no means hide from view the rocks and raging sea beneath, which in this situation exhibit the fatal effects of a fall in very strong colouring; while the swings and undulations of the bridge itself, and of a *single* hand rope, which scarce any degree of tension can prevent in so great a length, suggest no very comfortable feeling to persons of weak nerves.—Upon the whole, it is a beautiful bridge in the scenery of a landscape, but a frightful one in real life.

THE mode of fishing on this coast is different from any I have seen; perhaps it may be new to you.

THE

THE net is projected directly outward from the shore, with a slight bend, forming a bottom in that direction in which the salmon come: From the remote extremity a rope is brought obliquely to another part of the shore, by which the net may be swept round at pleasure, and drawn to land; a heap of small stones is then prepared for each person. All things being ready, soon as the watchman perceives the fish advancing to the net, he gives the watch-word*—immediately some of the fishermen seize the oblique rope, by which the net is bent round to enclose the salmon, while the rest keep up an incessant cannonade with their ammunition of stones, to prevent the retreat of the fish till the net has been completely pulled round them; after which they all join forces, and drag the net and fish quietly to the rocks.

THE salmon fisheries on the sea coast, and in the rivers of the north of Ireland, have

* At Portrush the word is *larrying*.

have sometimes been very productive, affording a valuable cargo for the Italian markets, during time of Lent:—The abundance of fish may in some measure be inferred from hence, that fourteen hundred salmon (as I am informed) have been taken in the river Bann at once hauling the net; and what is almost equally remarkable, near one thousand were caught at the succeeding haul. At present, however, the fisheries are but scanty, and it is the prevailing opinion, that the too great success of the river fisheries has undone them, by destroying the mother salmon, which should be allowed free passage through the rivers to cast their spawn.

Now that I am got upon the subject of fishing, let me tell you of an amusing instance of sagacity which I had an opportunity of seeing a short time ago, in a water dog of this country, who had become a most excellent fisher.

IN riding from Portrush to the Giant's Causeway with some company, we had occasion to ford the river Bush, near the sea; and as the fishermen were going to haul their net, we stopped to see their success. As soon as the dog perceived the men to move, he instantly ran down the river of his own accord, and took post in the middle of it, on some shallows where he could occasionally run or swim, and in this position he placed himself with all the eagerness and attention so strongly observable in a pointer-dog who *sets* his game.—We were for some time at a loss to apprehend his scheme, but the event soon satisfied us, and amply justified the prudence of the animal; for the fish, when they feel the net, always endeavour to make directly out to sea. Accordingly one of the salmon, escaping from the net, rushed down the stream with great velocity, toward the ford, where the dog stood to receive him at an advantage.—A very diverting chase now commenced, in which, from the shallowness of the water, we could discern the whole track
of

of the fish, with all its rapid turnings and windings. After a smart pursuit the dog found himself left considerably behind, in consequence of the water deepening, by which he had been reduced to the necessity of swimming. But instead of following this desperate game any longer, he readily gave it over, and ran with all his speed directly down the river, till he was sure of being again to seaward of the salmon, where he took post as before in his pointer's attitude.—Here the fish a second time met him, and a fresh pursuit ensued; in which, after various attempts, the salmon at last made its way out to the sea, notwithstanding all the ingenious and vigorous exertions of its pursuer.

THOUGH the dog did not succeed at this time, yet I was informed that it was no unusual thing for him to run down his game; and the fishermen assured me that he was of very great advantage to them, by turning the salmon toward the net; in which point of view his efforts in some measure corresponded

ponded with the cannonade of stones which I mentioned at Carrick-a-rede.

DURING the whole of the chase, this sagacious animal seemed plainly to have two objects in view; one, to seize his game, if possible; and the other, to drive it toward the net when the former failed; each of which he managed with a degree of address and ingenuity extremely interesting and amusing.

It is somewhat unaccountable, that mankind should look, with so much horror and disgust, on any remote similitude which some of the brute creation bear to the human person and features, and yet dwell with pleasure on much nearer approaches toward their prerogative faculty of reason; at least, thus much I am certain of, that we saw the exertions of this creature with infinite delight, and our regard for him seemed to encrease in proportion as our idea of his excellence encreased.—Perhaps it may be, that a consciousness of decided superiority in the latter case, makes us observe

the ingenuity of lower animals, without the allay of any uneasiness from an apprehension of rivalry.

LETTER

L E T T E R VII.

Portrush, August 6, 1784.

DEAR SIR,

YOU would hardly believe how small are the remains of Irish history, language, or customs, that can be traced in this part of the country: The revolutions which it has undergone, in consequence of forfeitures to the English, and the encroachments of the Scots, have overturned almost every remnant of its original state.

DURING the time that the English were endeavouring to extend their pale, in every direction from the metropolis of the kingdom,

dom, over a desperate but disunited enemy, the Scottish clan of M'Donalds, who by an intermarriage had got footing in Ireland, began their ravages on the northern coast of Antrim; and by the powerful support which they received from Cantire, and the western isles of Scotland, established their dominion over a tract of country near forty miles in length.

As the people of those days generally followed the fortune of their chief, the greater part of the native Irish who survived these bloody scenes, transplanted themselves elsewhere; while the Scots remained peaceable possessors of the field.—Hence the old traditions and customs of the country were entirely lost; and the few who speak the Celtic language at all, use a kind of mixed dialect, called here *Scotch-Irish*, which is but imperfectly understood by the natives of either country.

THE

THE present possessors are in general an industrious thrifty race of people. They have a great deal of substantial civility, without much courtesy to relieve it, and set it off to the best advantage.—The bold ideas of rights and privileges, which seem inseparable from their presbyterian church, renders them apt to be ungracious and litigious in their dealings.—On the whole, the middle and lower ranks of people, in this quarter of the kingdom, are a valuable part of the community; but one must estimate their worth as a miner often does his ore, rather by its weight than its splendor.

THERE are three or four old castles along the coast, situated in places extremely difficult of access, but their early histories are for the greater part lost.—The most remarkable of these is the castle of Dunluce, which is at present in the possession of the Antrim family. It is situated in a singular manner on an isolated abrupt rock, perforated by the waves; which have formed under it a very spacious cavern.

cavern. This rock projects into the sea, and seems as it were split off from the *terra firma*. Over the intermediate chasm lies the only approach to the castle, along a narrow wall, which has been built somewhat like a bridge, connecting it to the adjoining land; and this circumstance must have rendered it almost impregnable before the invention of artillery. On close examination it appears that there was originally another narrow wall, which ran across the chasm parallel to the former, and that by laying boards over these an easy passage might occasionally be made for the benefit of the garrison.

THE walls of this castle are built of columnar basalt, many joints of which are placed in such a manner as to shew their polygon sections; and in one of the windows of the north side, the architect has contrived to splay off the wall neatly enough, by making use of the joints of a pillar whose angle was sufficiently obtuse to suit his purpose.

THE

THE original lord of this castle and its territories, was an Irish chief, called Mc. Quilan, of whom little is known, except that, like most of his countrymen, he was hospitable, brave, and improvident; unwarily allowing the Scots to grow in strength, until they contrived to beat him out of all his possessions*.

IN the course of my expeditions through this country, I met with an old manuscript account of the settlement of the Scotch here, of which I shall give you a short extract. It will serve in a good measure to shew the barbarous state of the inhabitants in the sixteenth century, and the manner in which property was so readily transferred from one master to another.

THE

* " Above this, the country, as far as the river Bann, is called the Rowt, the seat of the Magwillies, a family of no small note among the Irish, but pent up in this narrow corner by the outrage and continual depredations of the island Scots."—*See Camden's Ireland—Antrim.*

120 LETTERS CONCERNING THE

THE manuscript is in the hands of the Mc. Donalds, and therefore most likely speaks rather in their favour.

“ About the year 1580, Coll. Mc. Donald came with a parcel of men, from Cantire, to Ireland, to assist Tyrconnell against great O’Neal, with whom he was then at war,

“ IN passing through the Root* of the county of Antrim, he was civilly received, and hospitably entertained, by Mc. Quillan, who was then lord and master of the Root.

“ AT that time there was a war between Mc. Quillan and the men beyond the river Bann; for the custom of this people was, to rob from every one, and the strongest party carried it, be it right or wrong.

“ ON

* A term by which this north west part of the county of Antrim is always denominated, sometimes written Route.

“ ON the day when Coll. Mc. Donald was taking his departure to proceed on his journey to Tyrconnell, Mc. Quillan, who was not equal in war to his savage neighbours, called together his militia or gallogloghs, to revenge his affronts over the Bann; and Mc. Donald, thinking it uncivil not to offer his service that day to Mc. Quillan, after having been so kindly treated, sent one of his gentlemen with an offer of his service in the field.

“ MC. QUILLAN was right well pleased with the offer, and declared it to be a perpetual obligation on him and his posterity. So Mc. Quillan and the highlanders went against the enemy, and, where there was a cow taken from Mc. Quillan's people before, there were two restored back: after which Mc. Quillan and Coll. Mc. Donald returned back with a great prey, and without the loss of a man.

“ WINTER

“ WINTER then drawing nigh, Mc. Quillan gave Coll. Mc. Donald an invitation to stay with him at his castle, advising him to settle himself until the spring, and to quarter his men up and down the Root. This, Coll. Mc. Donald gladly accepted; and in the mean time seduced Mc. Quillan's daughter, and privately married her; on which ground the Scots afterward founded their claim to Mc. Quillan's territories.

“ THE men were quartered two and two through the Root, that is to say, one of Mc. Quillan's gallogloghs and a highlander in every tenant's house.

“ IT so happened that the galloglogh, according to custom, besides his ordinary, was entitled to a meather* of milk, as a privilege. — This the highlanders esteemed to be a great affront;

* A vessel commonly used by the old Irish, formed out of one solid piece of wood, and usually of a triangular shape.

affront; and at last one of them asked his landlord,—“ Why do you not give me milk, “ as you give to the other ?”—The galloglogh immediately made answer, “ Would you, a “ highland beggar as you are, compare yourself to me, or any of Mc. Quillan’s gallogloghs ?”

“ THE poor honest tenant, (who was heartily weary of them both) said, “ Pray, “ gentlemen, I’ll open the two doors, and “ you may go and fight it out in the fair “ fields, and he that has the victory let him “ take milk and all to himself.”

“ THE combat ended in the death of the galloglogh; after which, (as my manuscript says) the highlander came in again, and dined heartily.

“ MC. QUILLAN’S gallogloghs immediately assembled to demand satisfaction; and in a council which was held, where the conduct
of

of the Scots was debated, their great and dangerous power, and the disgrace arising from the seduction of Mc. Quillan's daughter, it was agreed, that each galloglogh should kill his comrade highlander by night, and their lord and master with them; but Coll. Mc. Donald's wife discovered the plot, and told it to her husband—So the highlanders fled in the night time, and escaped to the island of Raghery*.

“ FROM this beginning, the Mc. Donalds and Mc. Quillans entered on a war, and continued to worry each other during the remainder of the century, until the English power became so superior in Ireland, that both parties made an appeal to James the First, who had just then ascended the throne of England.

“ James

* It is added, that Raghery not being at this time (A. D. 1580) inhabited, they were forced to feed on colts flesh, for want of other provisions.

“ JAMES had a predilection for his Scotch countryman, the Mc. Donald, to whom he made over by patent four great baronies, including, along with other lands, all poor Mc. Quillan’s possessions. However, to save some appearance of justice, he gave to Mc. Quillan a grant of the great barony of Enishowen, the old territory of O’Dogherty, and sent to him an account of the whole decision by Sir John Chichester.

“ MC. QUILLAN was extremely mortified at his ill success, and very disconsolate at the difficulties which attended the transporting his poor people over the river Bann, and the Lough Foyle, which lay between him and his new territory. The crafty Englishman, taking advantage of his situation, by an offer of some lands which lay nearer his old dominions, persuaded him to cede his title to the barony of Enishowen. And thus the Chichesters, who afterwards obtained the title of Earls of Donegal, became possessed
of

of this great estate; and honest Mc. Quillan settled himself in one far inferior to Enishowen."

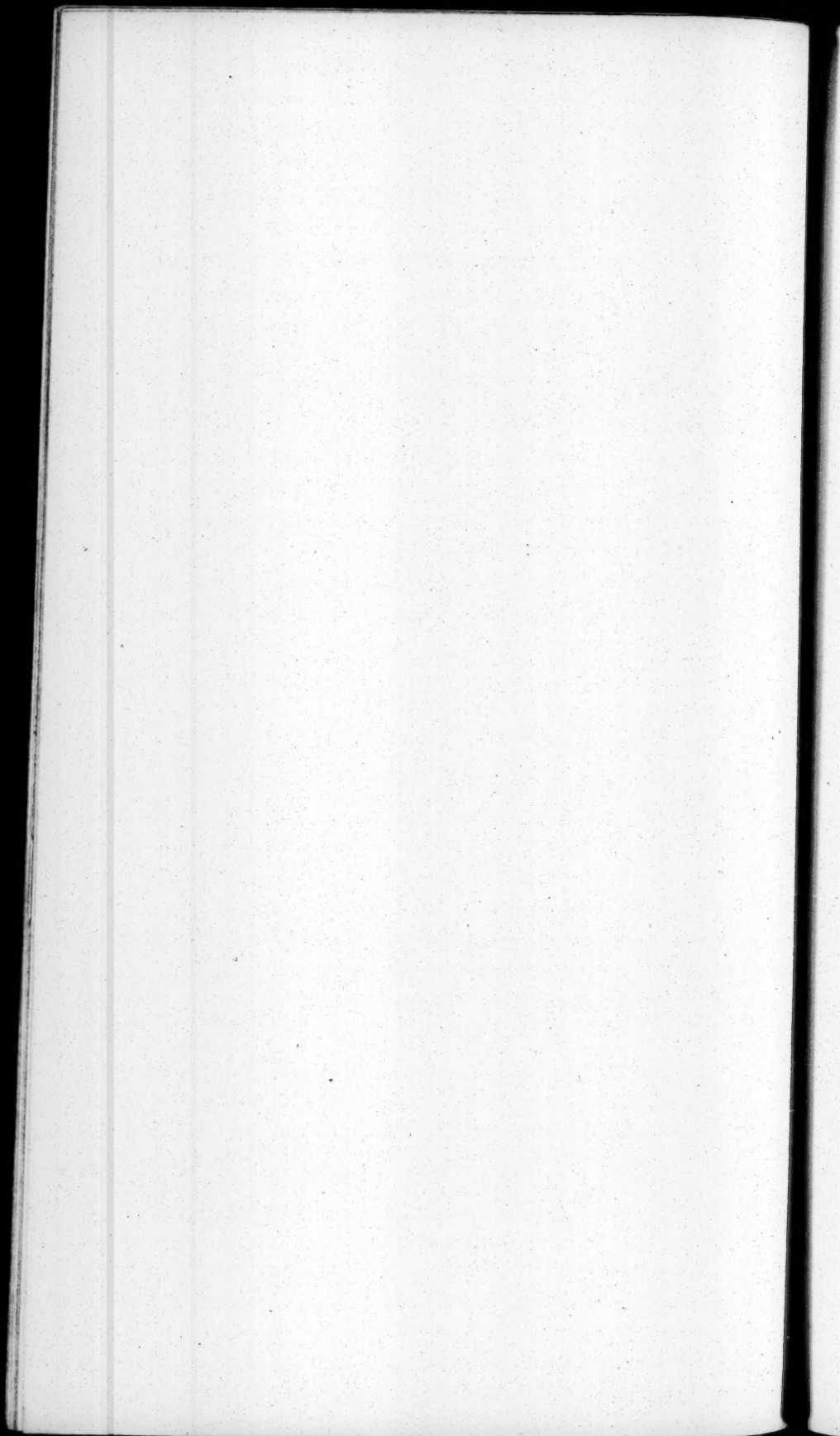
"ONE story more (says the manuscript) of Mc. Quillan—The estate he got in exchange for the barony of Enishowen was called *Clanreagburkie**, which was far inadequate to support the old hospitality of the Mc. Quillans. Bury Oge Mc. Quillan sold this land to one of Chichester's relations; and having got his new granted estate into one bag, was very generous and hospitable as long as the bag lasted. And so (continues the manuscript) was the worthy Mc. Quillan soon extinguished."

I SHOULD not have obtruded the account of the downfall of this Irish chief, but that it affords

* At present it is called *Clanaghurtie*;—the descendant of Mc. Quillan is still to be found there among the lowest rank of people, and only distinguishable from his neighbours by the ludicrous title of *King Mc. Quillan*.—"Tulit alter honores."

affords so good a reason for the utter obliteration of every ancient record and monument in this part of the country; and will plead my excuse for not adding somewhat to our collection of Irish antiquities.

LETTER



L E T T E R V I I I.

Portrush, August 13, 1784.

DEAR SIR,

A FEW days ago, as I rode across the headland of Bengore, a sudden shower of rain, falling very heavily, compelled me to take shelter in a little cabin, which stands on a wild spot in the middle of that promontory, on a piece of land called in the Irish language Aird, from the loftiness of its situation.—A well-looking young woman sat by the fire-side spinning at her wheel, with a parcel of children playing round her; but, notwithstanding her industrious employment,

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the house bore evident marks of poverty and distress about it.

As the rain still continued, I had an opportunity of asking several questions concerning the fortunes of this poor family, the history of which forms such a simple, melancholy tale, that I cannot help repeating it to you, though methinks you will accuse me of having brought it forward very *mal a-propos*.

THE original adventurer who settled in this solitary spot, was called Adam Morning, a name which he got from some accidental circumstance; and is described by the peasants of the neighbouring hamlet, as a clever fellow, and an honest man. He held his little farm, which had never before been cultivated, at the small rent of five pounds per annum, hoping soon to render it a valuable tenure by the probable effects of his industry; and on this he built the cottage which I have just mentioned, suited to his
infant

infant powers, but so contrived as to admit of an addition, whenever his success in improving this barren soil should entitle him to encrease his comforts.

By hard labour he soon reclaimed so much of the land as enabled him to sow a moderate quantity of grain; but when the toils of the year were almost over, and a plentiful harvest promised to reward his industry, a violent storm, which was severely felt over the whole kingdom, blasted his golden hopes; and the entire produce of his farm was only sixteen barrels of oats, out of twenty-four which he had sowed.

THIS was a severe blow to our enterprising farmer, but his resolution was not thus hastily to be vanquished;—means were found to pay his rent; a second crop was sowed the ensuing year, and his land again presented the cheering prospect of approaching plenty. Once more an inclement season, bearing heavily on the unsheltered situation of his new
 I 2 fields,

fields, mocked his expectation, and the entire reward of the year's labour amounted only to a small encrease of grain, little exceeding what he had sowed.

FEW men, in this lowly sphere of life, would have borne up against such rude and repeated shocks of adverse fortune; but the spirit of our humble adventurer disdained to yield to misfortunes which were merely casual, and which no degree of prudence could have guarded against.—His perseverance was still unshaken, his health continued vigorous, and the land yet promised to repay him, would Providence but smile on his endeavours.—New ways were therefore devised to save his sinking credit; every nerve was exerted to pay his rent, and try the fortune of another year.

THERE is a small bay in the promontory of Bengore, called Port na Spania, from the wreck of one of the celebrated Spanish Armada,

Armada, which was here dashed to pieces*. It is entirely surrounded by a monstrous precipice between three and four hundred feet high, and is accessible only by one narrow approach, which is far the most frightful of all the hazardous paths on this whole coast.

By the tenure of his farm the possessor was entitled to a quarter of this little bay, amounting to about twenty or thirty square yards of wild inhospitable rock†.

HERE Adam and his family, struggling against their distresses, laboured hard to supply their wants, by cutting the sea weed from
the

* The path of descent to Port na Spania lies in the land of a peasant who is not entitled to any part of the sea coast, but he receives, as a toll on his highway, every third hundred of kelp manufactured below—and this path, dangerous as it is, yet being the only one, makes it necessary to comply with the demand.

† The whole bay generally produces about four tons of kelp, which is sold at the rate of from five to six pounds per ton.

the rocks, and manufacturing it into kelp, which the linen bleachers of the country bought up at a good price; while in the mean time the farm was rising fast, and Ceres began again to smile propitious.

ONE morning, as Adam and his wife were descending down the dangerous path, to pursue their daily toil, while they were yet talking of their growing hopes, even while the cheerful prospect was smiling in their view, a sudden slip tumbled him headlong from the precipice, and dashed him to pieces on the rocks below*.

HIS son David, the heir of his humble fortunes, had just then returned from the West Indies, still crippled under a wound which he received in the service of his country on board a man of war, but prepared to assist the distressed of his father with the
little

* This melancholy accident happened in the summer of 1783, when I was in this neighbourhood.

little prize-money which had fallen to his share during his voyages.

THE tar had married a pretty young woman before he went to sea, (the same whom I saw busied in spinning) but instead of returning to a quiet happy family, he found nothing at home but misery and distress, and saw himself almost entirely adrift in the world, with a mother, a wife and children to maintain. The death of his father had brought all the hungry creditors forward, so that he became heir only to the poor cottage itself, and the naked land which surrounded it. However, it was his inheritance, and as such he would not part with it.

THE prize-money which he had got on his cruise, was, for the convenience of carriage (as his wife told me) mostly converted into plate; that is, he returned home with a silver watch, a large pair of silver knee and shoe buckles, and such other little matters of ornament as the vanity of a sailor, who pays a visit

visit to his old friends after a long absence, commonly delights to exhibit. With these David set out for the first fair that happened in the neighbourhood to buy a horse, which was absolutely necessary for the cultivation of his farm. But he was not in his own element. A jockey soon fell in with him, and the tar gave his silver watch, the chief fortune of the family, for a jaded horse, whom he afterwards found, on enquiry, old enough to have seen the days of Lord Hawke and Conflans, being upwards of twenty years of age.

OUR young farmer, alarmed at the marks of debility which too manifestly shewed themselves in his new horse, and terrified lest he might hastily give him the slip, and die in his hands, set out with all expedition to try his fortune at market once more; where, with the assistance of another piece of plate, he soon bartered his antiquated steed; and, under the influence of his late misfortune, purchased a colt almost as unserviceable from
his

his youth, as the former had been from extreme old age.

THESE calamities of the son, were little less ruinous than those of his father; but with this difference, that the misfortunes of the latter being such as no human foresight could have prevented, he was universally esteemed and pitied by the neighbourhood; while every body laughed at the simplicity which involved poor David in his distresses.

HOWEVER, some peasants of the next village, pitying his situation, admitted him into what is here called a *neighbour dealing*, that is, he was allowed to join his colt in the team with three of their horses, and the plough was alternately employed in each man's farm; by this means David has been enabled to till his inheritance, and this year a harvest of rich hope seems to promise a reward—whether it shall or not rests with Providence.

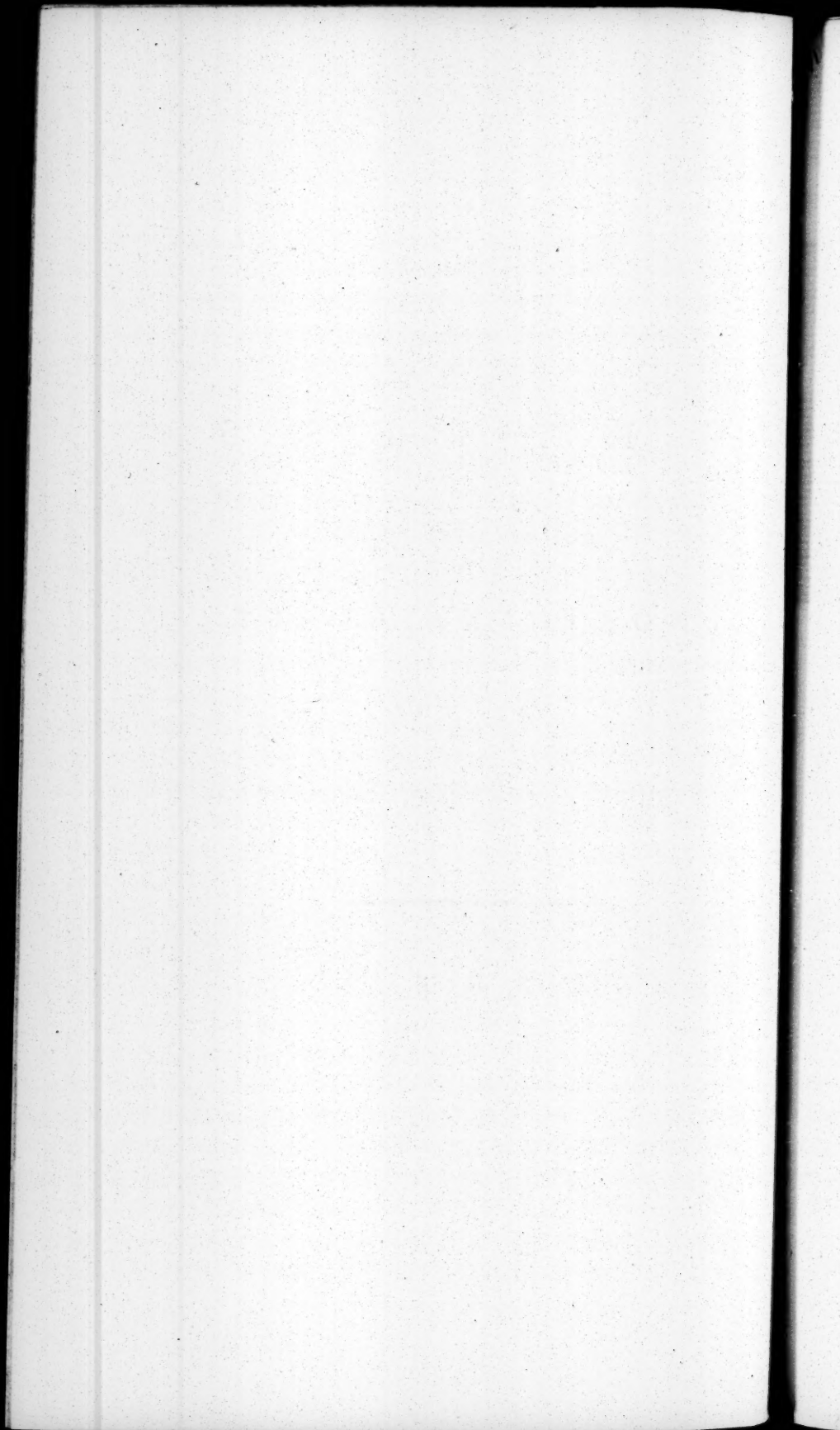
SUCH

SUCH is the simple, unadorned history of this poor family, affording an artless and affecting picture of the accidents and distresses of humble life, which I am sure will interest your feelings, and make you forget the tediousness of this digression from my main subject.

END OF PART I.

L E T T E R S
CONCERNING THE
N O R T H E R N C O A S T
O F T H E
C O U N T Y O F A N T R I M , I N I R E L A N D .

P A R T II.



PART the Second, containing the Mineralogical History of the County of Antrim, and such other Counties of the North of Ireland, as include the Basaltic Fossils.

In this Part is stated, a plain and impartial View of the Volcanic Theory of the Basaltes.



VIEW of the WEST SIDE of the GIANTS CAUSEWAY



LETTER I.

Portrush, August 20, 1784.

DEAR SIR,

IT is a pleasing, as well as an interesting pursuit, to observe the gradual advancement of mankind in any particular object of enquiry; to trace the wild shoot of infant philosophy from the natural soil, in which it has grown rank and uncultivated, to the garden of science, where it blooms in all the improved beauty and vigour which
the

the hand of art and industry can add to it. In this point of view, a little history of the opinions which have prevailed concerning the curious combination of pillars in this neighbourhood, called the Giants Causeway, may perhaps afford you some amusement; and if it do not bring with it much solid information concerning the operations of nature, yet it may be pleasant enough to see the various attempts which men have made to explain them.

THE native inhabitants of the coast, as they were the earliest observers of this wonder, so were they the first to account for its production; and however rude and simple their theory may be, yet a little consideration will satisfy us, that it does not deserve the ignominious appellation of being grossly barbarous and absurd. The Causeway was observed by the fishermen, whose daily necessities led them thither for subsistence, to be a regular mole, projecting into the sea, which answered for several convenient purposes: On closer inspection,

spection, it was discovered to be built with an appearance of art and regularity somewhat resembling the works of men, but at the same time exceeding every thing of the like kind which had been seen: And it was found that human ingenuity and perseverance, if supported by sufficient power, might be abundantly adequate to its production.

THE chief defect in this simple analogy, seems to have been the want of strength equal to the effect; but this was soon supplied in the traditions of a fanciful people, and Fin Mc. Cool*, the celebrated hero of ancient Ireland, became the giant under whose forming hand this curious structure was erected.

It was afterward discovered, that a pile of similar pillars was placed somewhere on the opposite coast of Scotland; and hence a general confused notion prevailed, that this

K mole

* Fian Mc. Cumhal, Mr. Mc. Phetson's more modern Fingal.

mole was once continued across the sea, connecting the Irish and Scottish coasts together.

NEAR the end of the last century, when this kingdom began to revive from its misfortunes under the regulations of William the Third, the spirit of enquiry, which the Royal Society of London had just then called forth, began to busy itself about this singular and original wonder. At this period we find, among the papers of the Society, a letter from Sir Richard Bulkley to Doctor Lyfter on this subject, dated in the year 1693, of the merits of which you may judge by the following extract:

“ CONCERNING the Giants Causeway.—
 “ Prolixity in a philosophical description I’m
 “ sure you’ll pardon, for I was very exact
 “ in getting it from a person that was *Rei*
 “ *Compos*, perhaps *Peritus*. A scholar, a
 “ master of arts in Cambridge, and a travel-
 “ ler,

“ ler, who went on purpose with the Bishop
 “ of Derry to see it, &c.

“ THIS whole Causeway (says the scholar)
 “ consists of pillars of perpendicular *cylinders*.
 “ The pillars do not consist of joints, as you
 “ were informed, but each cylinder is one
 “ solid piece, only indeed in breaking it
 “ breaks crosswise, and not lengthwise, which
 “ we commonly call splitting. And all the
 “ stones that rise up on the strand are all
 “ cylinders, though of never so many dif-
 “ ferent angles, for there are also four-
 “ squared upon the same shore.—That the
 “ cylinders do not consist of joints is evident
 “ from hence, that the pieces, so broken off,
 “ have their bottoms as often convex or con-
 “ cave, as flat or even*.”

K 2

THUS

* With all due deference to this Cambridge master of arts, who so scientifically describes these *four-squared cylinders*, he must have made some very unaccountable mistake, or else matters have been strangely altered since his time, for there is not now a single pillar to be found in the whole Causeway, which is not clearly separable into very many distinct joints.

THUS has this intelligent traveller demonstrated that these pillars have no joints, from the very circumstance which, beyond all others, renders their articulation most curious and surprising.

IN consequence of the information which this gentleman gave of the want of joints, people began to compare these pillars with the regular fossils then best known, the *Entrochi*, *Asteriæ*, and the rock Crystal, which, on a diminutive scale, seemed to bear resemblance with the larger masses in the Giants Causeway; and, to this end, a number of quæries were drawn up by Sir Richard Bulkley, which, with their answers by Doctor Samuel Foley, are published in the Philosophical Transactions of that period.

SUCH are these following:

“ ARE any of the pillars hexagons, or squares? Or be they pentagons only?

“ HAVE

“ HAVE the tops of the pillars any gravings
“ or striate lines on them ?”

“ Is the superficies caniculate, or otherwise
“ grooved ?” &c. &c.

ALL which quæries, though truly enough answered, yet produced very little useful information; being entirely directed to the mere exterior appearance of the Causeway itself, without paying any attention to the general features of the coast, to the attendant fossil substances, or even to the nature and chemical properties of the stone itself, which is utterly different from those fossils with which it was then compared. However, the British philosophers seem to have pursued the analogy, derived from the crystallization of spars and other similar substances, with very great confidence; insomuch that the authors of the late appendix to their Encyclopædia have endeavoured to give it an air of probability, by delineating many of the basalt pillars as terminating in pyramids, like the
common

12 LETTERS CONCERNING THE

common rock crystal, and some species of salts*.

To these answers a sketch was added, of which, an engraving is published in the Philosophical Transactions, entitled, “A Draught
“ of the Giants Causeway, which lies near
“ Bengore Head, in the County of Antrim,
“ by Christopher Cole. A. D. 1694.” Of this drawing and its imperfections, the account which Doctor Foley himself gives will be the best description.—“He tells me he
“ has not drawn the Giants Causeway as
“ a prospect, nor yet as a survey or platform,
“ for this he thought would not answer his
“ design; and that he has no name for it
“ but a draught, which he took after this
“ fort. He supposed the hills and Causeway
“ to

* This representation of the pillars has probably been taken from a drawing of the basaltic of Saxony, sent many years ago to Gefner, together with a description of that species of stone by Kentman: This drawing contains many errors, and among the rest exhibits pillars of basaltic with conical terminations.

“ to be epitomised to the same height and
“ bigness the draught shews them, and this
“ he fancied the most intelligible way to ex-
“ press it.”

DOCTOR Thomas Molleneux was the first person, who took any very considerable pains, to procure information concerning the Giants Causeway; and we have reason to lament, that the necessary attendance of his profession prevented him from making his observations in person, for which he seems to have been well qualified: However, his intelligence was the best that had yet been collected. It was found, that this species of stone was not confined to the Giants Causeway alone, but might be discovered in the mountain of Dunmull; nay, that it was certainly of the same species with the Lapis Misneus, or basaltus of Stolpen, in Saxony, of which a slight description had been given by Agricola, in his History of Fossils.

By

14 LETTERS CONCERNING THE

By the influence of this gentleman in the Dublin Society, that body employed a painter of some eminence to make a general sketch of the coast near the Causeway; but neither the talents nor fidelity of the artist seem to have been at all suited to the purpose of a philosophical landscape.

AN engraving of this is published under the following title :

“ A true Prospect of the Giants Cause-
“ way near Bengore Head, taken from the
“ North West, by Edward Sandys, A. D.
“ 1696, at the Expence of the Dublin So-
“ ciety.

“ Right Hon. Sir Cecil } President.
“ Week, Knt. }

“ Rev. Dr. Ashe, Bishop } Vice-Presi-
“ of Cloyne, } dents.”
“ William Molleneux, Esq; }

IN this *true* prospect, the painter has
very much indulged his own imagination at
the

the expence of his employers, infomuch that feveral tall pillars, in the fteep banks of this fanciful fcene, appear loaded with luxuriant branches, fkirting the wild and rocky bay of Port Noffer* with the gay exhibition of ftately foreft trees. In the back ground he difcovered a parcel of rude and ufelefs materials, which his magic pencil foon transformed into comfortable dwelling-houfes; and for chimneys he has happily introduced fome detached pillars of bafaltes, which, from their peculiar fituation, and the name given to them by the peafants of the country, naturally excited the attention of this extraordinary artift. And thus were concluded the labours of the laft century concerning this curious work of nature.

FROM

* This bay lies immediately eaftward from the Caufeway. I have here written the name nearly as it is pronounced by the natives, who have fcarce any knowledge of the Irifh language; but the proper mode of writing it fhould be Port na Bfathach, which fignifies the Giants Port.

FROM that period, the basalt pillars of this kingdom passed almost unnoticed for half a century, and seem to have been viewed cautiously, and as it were at a distance, by men of science, who appeared slow to engage with an object which had hitherto entirely baffled the attempts of every theorist.

IN the year 1740 Mrs. Susannah Drury made two very beautiful and correct paintings of the Giants Causeway, which obtained the premium appointed for the encouragement of arts in Ireland; and these drawings being soon after engraved by the hand of an eminent artist, and published, the attention of the world was once again directed toward this antiquated subject.

SHORTLY after this, Doctor Pococke, a gentleman of considerable industry in philosophical pursuits, made a tour through the county of Antrim, and was the only person who appears to have taken a general view of the coast, of which he has given a
curfory

curfory description. But not content with a plain history of matters of fact, the learned Doctor ventured to start a new theory of his own, which I fear will not stand the test of a critical examination: To say the truth, it is little else than the doctrine of the Atoms of Epicurus in a modern drefs*.

He conceives that the basaltcs might once have been fufpended in a watery medium, either in folution, or as a kind of mud: That, at certain times, accidental fits of precipitation took place, in fuch manner as to form a range of fhort cylinders, whose upper ends fhould chiefly be convex: That, as thefe joints became fomewhat folid, a fecond fit of precipitation took place, forming a fecond range of incumbent joints, which muft generally be concave, adapted to the convexity

* Ille cenfet, in infinito inani, in quo nihil nec fumum, nec infimum, nec medium, nec ultimum, nec extremum fit; ita ferri, ut concurfionibus inter fe coherefcant: ex quo efficiantur, ea quæ fint, quæque cernantur omnia.

vexity of the lower order; and thus, by successive fits of precipitation, he supposes a set of erect cylinders might be generated in contact with each other. Now a set of cylinders can touch only in right lines, and therefore must leave empty spaces between them; but the pillars being yet soft, and yielding to the encreasing pressure from above, should, he imagines, dilate, and spread themselves out so as to fill up the vacuities. And thus he conceives may the polygon, articulated pillars, of the Giants Causeway, be generated.

I SHALL not delay you by any commentary on this unhappy theory, only to observe, that a more accurate enquiry would have discovered horizontal, and even curved pillars, for the production of which this cause is utterly inadequate*.

SUCH

* Mr. D'Acoſta, who has published this account of Doctor Pecoche's in his History of Fossils, strangely ranks the

SUCH is the history of the Giants Causeway, and such have been the labours of the learned, and their various opinions concerning its structure; in which, whatever may have been already accomplished, much certainly remains to be done, towards a judicious arrangement of a sufficient quantity of materials, whereon to build any general theory that can satisfy a reasonable mind, with respect to its formation.

THE extent of country contiguous to the Causeway, through which all the varieties of this species of stone prevails, is much greater than has hitherto been imagined: And within these few years, it has been discovered abroad, that the basalt is a very common fossil
through

the basalt among the class of marbles, or stones allied to marbles, with which it has not any one common feature of resemblance, except that it will receive a polish; so that he might with equal propriety have classed it with any other hard substance in nature. In truth he seems to be very ill informed on the subject, imagining this to be the only stone of the kind every discovered, and is in amaze to think how far it may extend into the sea.

through every part of the world, there being few kingdoms where it may not be found under one shape or another. Hence it has come to pass, that the observations of men of science in distant places have been united on this subject; different theories have been compared together; and more general analogies suggested, on which to build some rational conjectures, concerning the cause that might have produced these wonderful pillars.

It is somewhat singular however, that during these enquiries abroad, all appeals which have been made to the Giants Causeway, in favour of any particular system, have always proved fallacious; and still more extraordinary, when one considers that these errors should have principally arisen from the extreme pains employed in describing it, particularly from those two accurate and beautiful drawings executed by Mrs. Drury, which have really been a stumbling block to most of the foreign writers on this subject. Thus Mons. Demarest, the ingenious father of the
volcanic

volcanic theory of basalt, strangely imagines that the Causeway has been a current of lava erupted from the side of a conical mountain, though there be not a mountain of any sort immediately in its vicinity, nor one of that particular shape within a great many miles of it.—The truth is, that gentleman saw these much celebrated drawings, and has mistaken the segment of a shelving cape, at whose base the pillars stand, for a portion of a conical hill cut down in the direction of its axis; and this error has been confirmed by the prevailing custom of putting those pictures together in the same frame; so that the two segments, standing back to back, exhibit the appearance of an entire conical mountain, such as Mr. Demarest describes*.

IT

* Je tirai de cette conformité reconnue, une conséquence que la force de l'analogie m'autorisoit à tirer: cette conséquence me fit voir, dans la Chaussée de Geans, & dans toutes les Masses prismatiques qui se montrent sur les bords escarpés de la Mer en Irlande, en un Mot, dans les Sommets tronqués, qu'en y'apperçoit, l'ouvrage des éruptions, d'un ou de plusieurs Volcans, qui se sont éteints, comme
ceux

It was also observed by foreigners, that, in every drawing and description of the Giants Causeway, particular attention was paid to the circumstance of its projecting into the sea; hence a crude and indefinite opinion was adopted by many writers, that the pillars of basalt were produced by the refrigeration of a liquid body of lava, in consequence of being suddenly plunged into the ocean. Such is the theory of a Mr. Raspe, who has published an account of the valley of Hesse Cassel in Germany; and such are the sentiments advanced by Mons. De Luc, in his Letters addressed to the Queen of England, in which he gives as his opinion, that the ancient volcanos were formed in the ocean, where the sudden cooling of the melted mass (not to count on the presence of the marine salt) might have determined a regularity

ceux d'Auvergne.—See Mons. Demarest's Memoir on the Basalt of Auvergne, in the Volume of the French Academy for 1771.

a regularity of figure in the cooling body*.

THOUGH this opinion does, with some ingenuity, assign a reason why the basaltic pillars are not produced, at this day, as they were formerly; yet a little consideration will shew that it ought not hastily to be adopted; since general experience teaches us, that all tumultuary causes are only adapted to introduce tumultuary effects: Every species of regular figure produced by crystallization, or any mode whatever analogous to it, being always more perfect, in proportion as length of time, and rest, have allowed the different particles to unite gradually: indeed a moment's reflection must satisfy any one, that the furious encounter of a river of liquid fire with

L the

* Or, on voit une cause de plus, dans les Volcans anciens, que dans les modernes, pour produire cet effet; c'est de s'être formés dans la Mer, où, sans compter la présence du Sel, l'attouchement seul de l'eau, en produisant une condensation plus subite, a pu être une circonstance déterminante.

*See Lettres adressées à la Reine de la Grande Bretagne,
par Mr. J. A. De Luc, vol. 2, p. 480.*

the waters of the ocean, so far from being adapted to form the neat and elegant arrangement of our pillars of basalt, can only tend to introduce confusion and irregularity.— But in truth, any argument derived from the particular situation of the Giants Causeway, will be found extremely erroneous; because the circumstance of its standing in the sea, is purely accidental; similar pillars being often discoverable on the summit of the highest grounds in its neighbourhood, many hundred feet above the level of the beach.

I SHALL no longer weary your patience, by a more minute account of the opinions to which this celebrated Causeway has given birth; but shall hasten to take a general view of the fossils that prevail through this part of Ireland; and to give some account of the bold volcanic theories that have been advanced to explain the production of the pillars of basalt.

LETTER

LETTER II.

Portrush, August 24, 1784.

DEAR SIR,

THE vicinity of the little fishing village of Portrush to the Giants Causeway, has afforded me, during my stay here, ample opportunity to visit that curious work of nature, and to examine, with a good deal of attention, the features of the adjoining country, which abounds in varieties of the basaltic that have hitherto been very imperfectly known*.

THE

* The etymology of the word basaltic is extremely uncertain. The term is of a very early date, and most probably of eastern origin.

The Greek word *Βασανίτις*, to use as a touchstone; the

THE Causeway itself is generally described as a mole or quay, projecting from the base of a steep promontory, some hundred feet, into the sea; and is formed of perpendicular pillars of basalt, which stand in contact with each other, exhibiting a sort of polygon pavement

Hebrew root ברזל, Barzal, denoting Iron; the Ethiopic and Hebrew term בַּשָּׁל, Basal, expressing baked, or possibly burnt; have all been used, in turn, as etymological sources of the basalt.

It is not much to be lamented, that the original meaning of the term lies in obscurity; as the imperfect discrimination between different fossils, which obtained among the ancients, makes it probable that the genuine etymology would have referred to some property common to the basalt, and a thousand other substances, and therefore would serve only as a source of error. Thus Pliny ranks it among the class of marbles, with which it has no resemblance, except that it can be broken and polished. (*See Pliny, l. 36.*)

The term seems to have been generally applicable to a dark-coloured ponderous stone, of a close iron texture, sometimes found in a columnar form. (*See Pliny*). From hence, and the success with which the Roman artists of the present age, repair the Egyptian statues of oriental basalt with the occidental stone of the same name (*See Mr. Ferber's Letters on Italy, p. 199.*) it seems to be sufficiently clear that the present application of the word coincides with its ancient use.

ment somewhat resembling the appearance of a solid honeycomb. The pillars are irregular prisms, of various denominations, from three to eight sides*; but the hexagonal columns are as numerous as all the others together.

ON a minute inspection, each pillar is found to be separable into several joints, whose articulation is neat and compact beyond expression; the convex termination of one joint, always meeting a concave socket in the next; besides which, the angles of one frequently shoot over those of the other, so that they are completely locked together, and can rarely be separated without a fracture of these parts.

THE

* Mr. Faujas de St. Fond took much pains to search for pillars of nine sides among the basaltic of Vive-rais, in consequence of the account which Mr. Molleneux and Mr. de Lisle gave, that such were to be found; but there is little doubt that both these gentlemen were mistaken: none of that denomination are to be discovered at the Giants Causeway or in its neighbourhood; Indeed octagonal pillars can very rarely be met with.

28 LETTERS CONCERNING THE

THE fides of each column are unequal among themselves, but the contiguous fides of adjoining columns are always of equal dimensions, so as to touch in all their parts.

THOUGH the angles be of various magnitudes, yet the sum of the contiguous angles of adjoining pillars, always makes up four right ones; so that there are no void spaces among the basaltcs, the surface of the Causeway exhibiting to view a regular and compact pavement of polygon stones.

THE outside covering is soft, and of a brown colour, being the earthy parts of the stone, nearly deprived of its metallic principle, by the action of the air, and of the marine acid which it receives from the sea*.

THESE

* This coating contains iron which has lost its phlogiston, and is nearly reduced to a state of calx; for with a very moderate heat it becomes of a bright red ochre colour, the attendant of an iron earth.

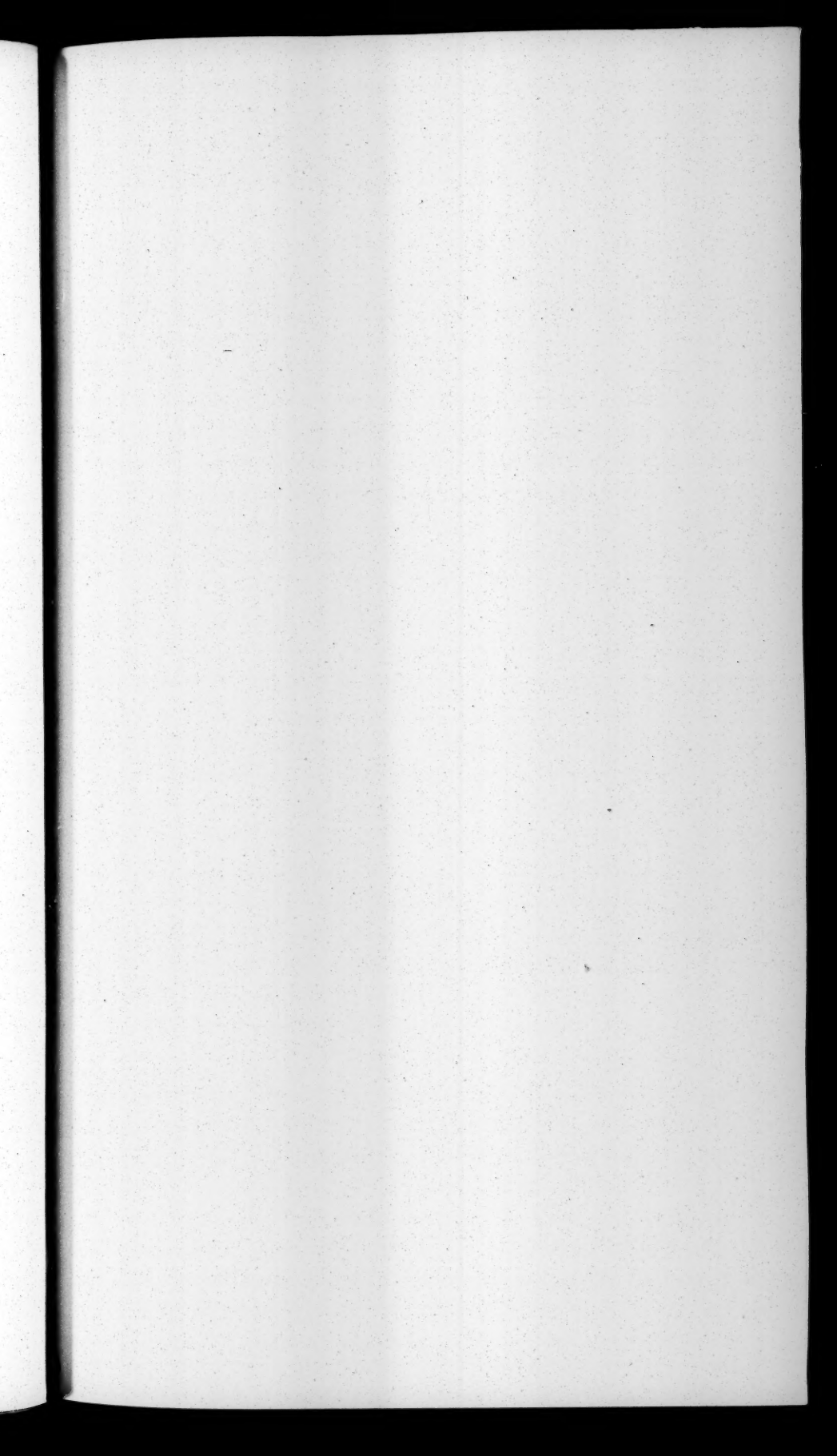
THESE are the obvious external characters of this extraordinary pile of basalt, observed and described with wonder by every one who has seen it. But it is not here that our admiration should cease ;—whatever the process was, by which nature produced that beautiful and curious arrangement of pillars so conspicuous about the Giants Causeway ; the cause, far from being limited to that spot alone, appears to have extended itself through a large tract of country, in every direction ; inasmuch that many of the common quarries, for several miles around, seem to be only abortive attempts towards the production of a Giants Causeway.

FROM want of attention to this circumstance, a vast deal of time and labour has been idly spent in minute examinations of the Causeway itself ;—in tracing its course under the ocean—pursuing its columns into the ground—determining its length and breadth, and the number of its pillars—with numerous wild conjectures concerning its original ;

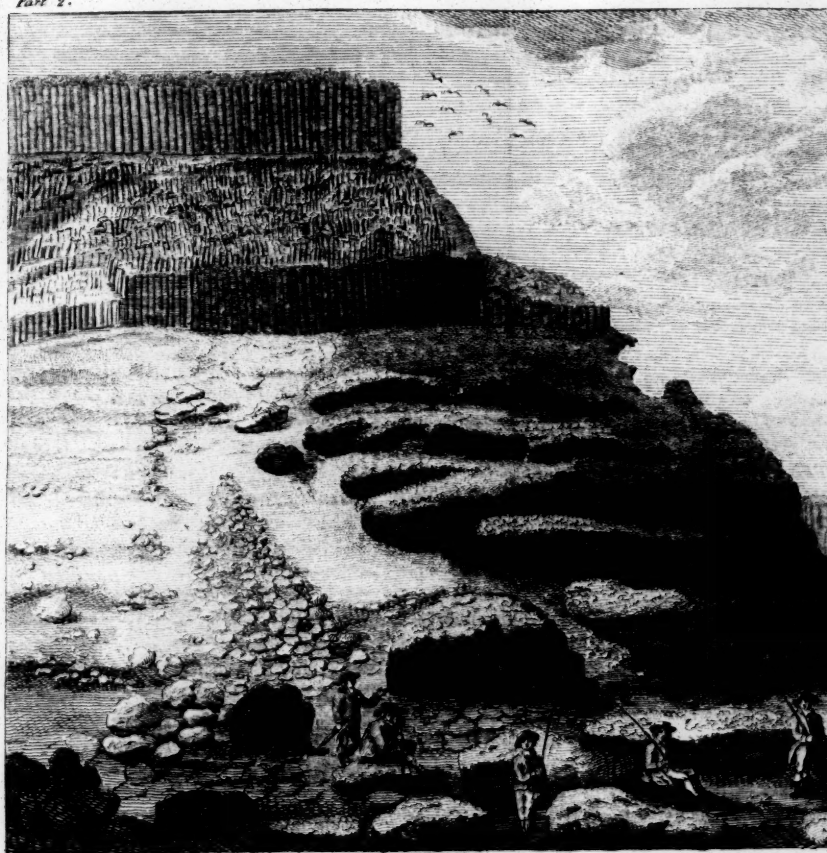
original; all which cease to be of any importance, when this spot is considered only as a small portion of an immense mass of basalt, extended widely over the neighbouring land.

THE leading features of this whole coast, are the two great promontories of Bengore and Fairhead, which stand at the distance of eight miles from each other: Both formed on a great and extensive scale, both abrupt toward the sea, and abundantly exposed to observation; and each, in its kind, exhibiting noble arrangements of the different species of columnar basalt.

THE former of these lies about seven miles west of Ballycastle, and is generally described by seamen, who see it at a distance and in profile, as an extensive headland, running out from the coast a considerable length into the sea; but, strictly speaking, it is made up of a number of lesser capes and bays, each with its own proper name, the *tout ensemble* of which



Part 2.



Eastern View of CAPE PLEASKIN



J. Bond Sculp.

SKIN in the Promontory of Bengere.



which forms what the seamen denominate the headland of Bengore.

THESE capes are composed of variety of different ranges of pillars, and a great number of strata; which, from the abruptness of the coast, are extremely conspicuous, and form an unrivalled pile of natural architecture, wherein all the neat regularity and elegance of art is united to the wild magnificence of nature.

THE most perfect of these capes is called Pleaskin, of which I shall attempt a description, and along with it hope to send a drawing, which my draftsman has taken from the beach below at the risque of his neck; for the approach from these promontories down to the sea, is frightful beyond description, and requires not only a strong head, but very considerable bodily activity, to accomplish it.

THE summit of Pleaskin is covered with a thin grassy sod, under which lies the natural
basaltic

basaltic rock, having generally a hard surface, somewhat cracked and shivered. At the depth of ten or twelve feet from the summit, this rock begins to assume a columnar tendency, and forms a range of massy pillars of basaltes, which stand perpendicular to the horizon, presenting, in the sharp face of the promontory, the appearance of a magnificent gallery or colonnade, upward of sixty feet in height.

THIS colonnade is supported on a solid base of coarse, black, irregular rock, near sixty feet thick, abounding in blebs and air-holes—but though comparatively irregular, it may be evidently observed to affect a peculiar figure, tending in many places to run into regular forms, resembling the shooting of salts and many other substances during a hasty crystallization.

UNDER this great bed of stone, stands a second range of pillars, between forty and fifty feet in height, less gross, and more sharply defined than those of the upper story, many
of

of them, on a close view, emulating even the neatness of the columns in the Giants Causeway. This lower range is borne on a layer of red ochre stone, which serves as a relief to shew it to great advantage.

THESE two admirable natural galleries, together with the interjacent mass of irregular rock, form a perpendicular height of one hundred and seventy feet; from the base of which, the promontory, covered over with rock and grass, slopes down to the sea for the space of two hundred feet more, making in all, a mass of near four hundred feet in height, which in beauty and variety of its colouring, in elegance and novelty of arrangement, and in the extraordinary magnitude of its objects, cannot readily be rivalled by any thing of the kind at present known*.

THOUGH

* As this cape exhibits a copious variety of basaltic substances, distinctly marked in their appearances and relative situations, and capable of being attentively examined, it may be proper to enumerate, with more precision, the different fossils which it contains, and their relative position. It should be observed, that the strata, considered within a small space, appear pretty nearly horizontal

34 LETTERS CONCERNING THE

THOUGH there are but two complete ranges of pillars visible in any of the promontories,

zontal, although the descent of the promontory, and of the coast, generally taken, be in reality from the sea toward the land. The *mean height* of this northern coast and of the country contiguous to it probably equals 1000 feet; yet the surface of Lough Neagh, situated in the midst of this part of Ireland, is not elevated more than 38 feet above the ocean.

CAPE PLEASKIN.

No.		Feet.
1	Summit, irregular basalt, shivered and cracked at the surface - - -	12
2	Perpendicular range of gross pillars, containing air-holes - - -	60
3	Gross bed of rude basalt, shewing marks of a tendency toward forms, resembling an imperfect crystallization - - -	60
4	Second range of regular pillars, neat, and divided into joints - - -	40
5	Bed of red argillaceous ochre, on which the second range of pillars rests - - -	22
6	A thin course of iron ore amid the bed of ochre - - -	
7	Soft argillaceous stone, of various colours, and a mottled appearance, friable, and resembling a variety of steatites - - -	
8	Succession of five or six gross beds of table basalt, between which, thin strata of ochre and other substances occur - - -	180

374

A considerable

tories, yet it is not improbable that there may be many more in succession, at various depths under ground; and this opinion is confirmed by columnar marks which can be traced in several rocks that lie in the sea. The Causeway itself is situated at the base of one of these capes, on the level of the beach, and appears as part of a columnar bed that has been accidentally stripped and washed during a long course of years by rains and the waves of the ocean.

THE pillars of this whole headland of Bengore, appear naturally to affect a perpendicular situation, and in the few places where they lie in an inclined posture, it seems to be the effect of some external cause, which has deranged them from their original disposition.

Indeed,

A considerable part of the basaltic of this cape is cellular in a greater or less degree; even the pillars of the second range are so in some measure. These cells are generally filled either with zeolite, or with a fine brownish argill.

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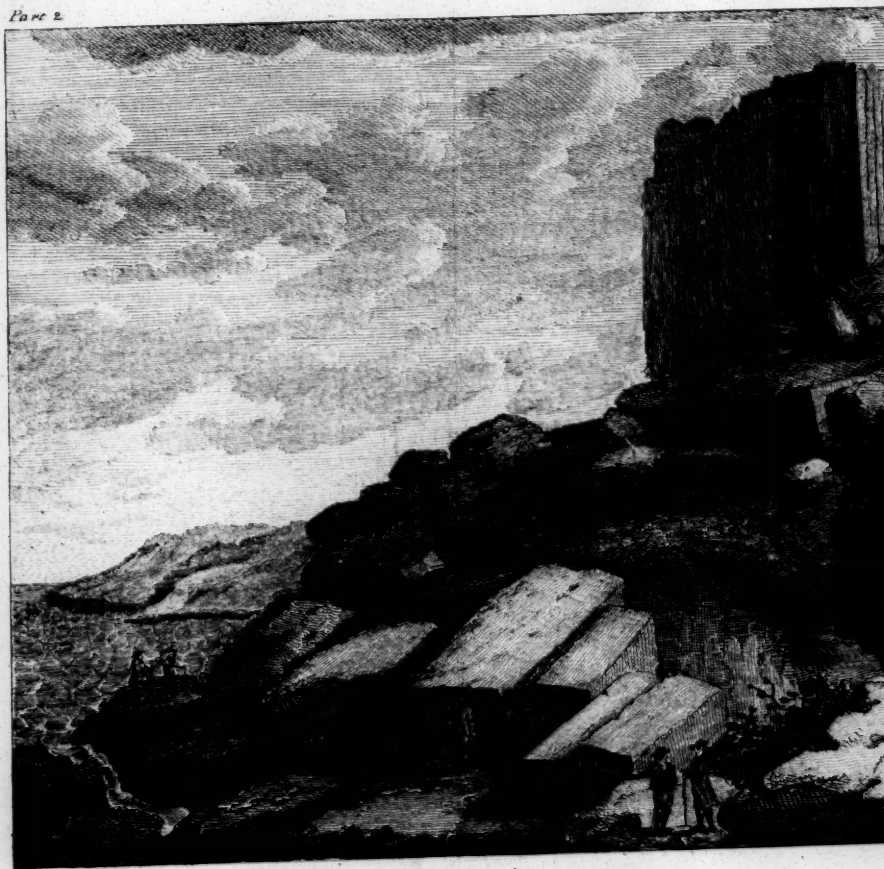
Indeed, where the forms of crystallization are imperfect, they may be seen to shoot in various directions, and sometimes in irregular curves; but, in most of these instances, the columnar outline is very rude and unfinished.

It is worth remarking, that the ranges of pillars are more perfect, in proportion as they lie deeper under ground; the second range in Pleaskin is evidently better finished than the upper one, and contains much fewer irregularities in the grain of its stone; while the pillars of the Causeway, which runs into the sea itself, have still a greater sharpness in their figure, and are more close and uniform in their texture.

SUCH is the general outline of this great headland, affording objects extremely interesting to every one, who may wish to study nature in her bold and uncommon works.

AT

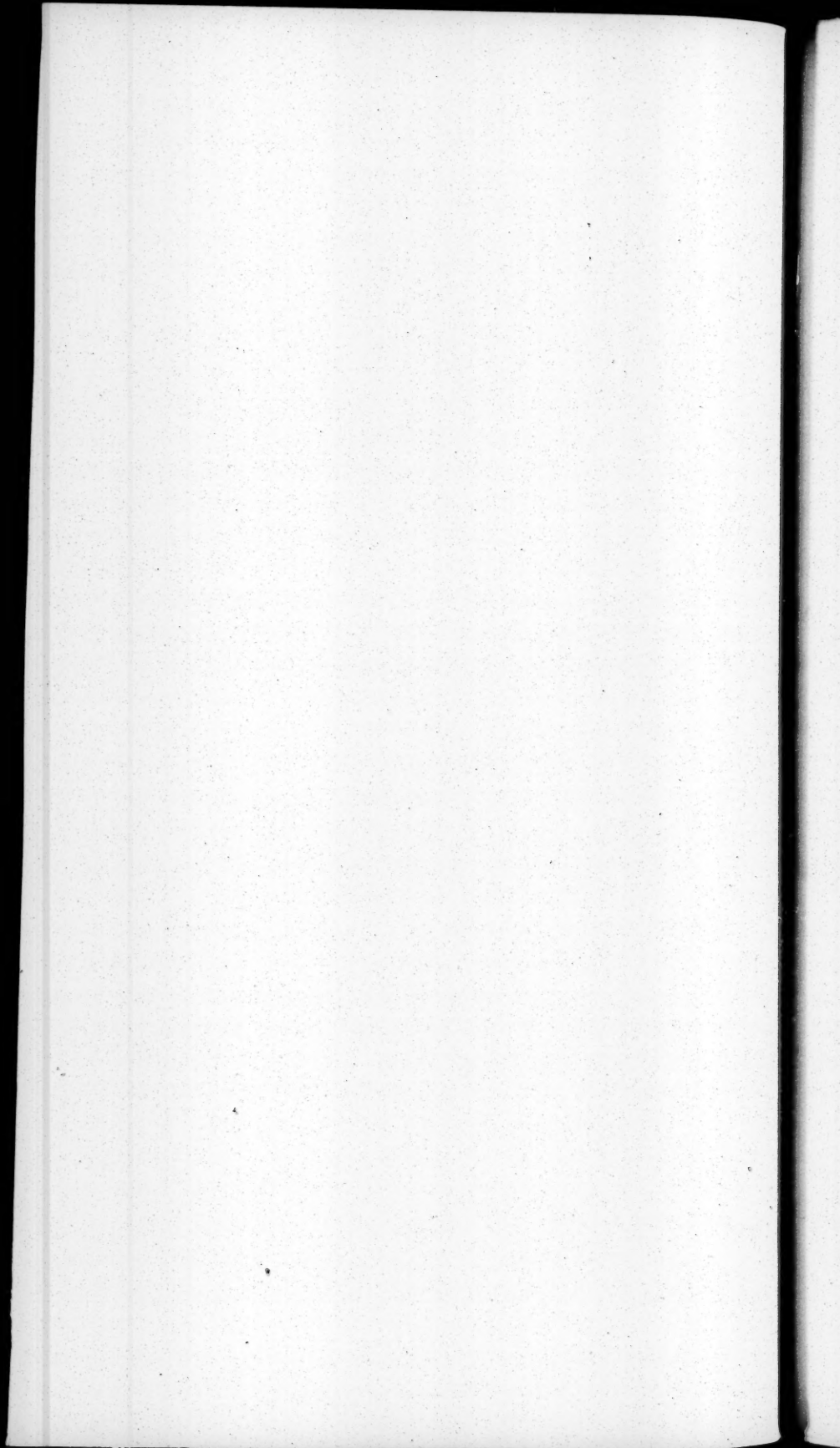




View of CASAN AN THIR LEITH or the grey Man,



Mans path in the flomontory of Fairhead.



AT the distance of eight miles from hence, (as I mentioned before) the promontory of Fairhead * raises its lofty summit more than five hundred feet above the sea, forming the eastern termination of Ballycastle bay. It presents to view a vast mass of rude columnar stones, the forms of which are extremely gross, many of them exceeding two hundred feet in length, and the texture so coarse, as to resemble an imperfect compact granite, rather than the uniform fine grain of the Giants Causeway basalt †. At the base of these gigantic columns lies a wild waste of natural ruins, of an enormous size, which in the course of successive ages have been tumbled down from their foundation, by storms, or some more powerful operations of nature.

These

* This is the Robogdium Promontorium of Ptolemy the geographer. Its Irish name is *Ben-mare* or the Great Promontory.

† These pillars do not at first view appear to have any marks of articulation; but on observing such as have fallen down from the top of Fairhead, they are found to be often separated into pretty regular joints by the force of the fall.

These massive bodies have sometimes withstood the shock of their fall, and often lie in groups and clumps of pillars, resembling many of the varieties of artificial ruins, and forming a very novel and striking landscape.

A SAVAGE wildness characterizes this great promontory, at the foot of which the ocean rages with uncommon fury. Scarce a single mark of vegetation has yet crept over the hard rock to diversify its colouring, but one uniform greyness clothes the scene all around. Upon the whole, it makes a fine contrast with the beautiful capes of Bengore, where the varied brown shades of the pillars, enlivened by the red and green tints of ochre and grass, casts a degree of life and cheerfulness over the different objects *.

THOUGH

* The ruins which lie tumbled at the base of this promontory, render it difficult to determine, precisely, what the substances are that may be situated beneath the basalt. However, from attentive examination, there is reason to imagine, that this enormous pile rests on the fossils usually attendant on beds of sea coal; and that the strata of the Ballycastle coal-pits, which appear to be of a date antecedent to that of the basalt, extend entirely under the promontory of Fairhead.

THOUGH I have *particularly* described the basaltic of these two magnificent promontories, yet there are many other similar arrangements through this country; which, though less worthy of admiration as great objects, yet become extremely interesting, when one wishes to search, minutely, into the natural causes that might have produced these extraordinary pillars.

THE mountain of Dunmull, lying between Coleraine and the river Bush, shews abundance of this species of stone, particularly at the craigs of Islamore, where two different ranges of columns may be discovered; and at most of the quarries which have occasionally been opened round that mountain.—They may be seen also in Dunluce-hill, near the castle of Dunluce: In the bed of the river Bush, near the bridge of Bushmills: On the summit of the mountain of Croaghmore: In many parts of the high land over Ballintoy: In the island of Raghery; and various other

M places

places along the coast, even to the entrance of Carrickfergus bay.

I SHALL not, at present, delay you with a minute description of each of these; but may, in the course of my Letters, take an opportunity to mention the general character of the face of this country, and any singularities worthy notice, in the forms and situation of its basaltic.

Your's.

LETTER

L E T T E R III.

Portrush, August 13, 1784.

DEAR SIR,

IN my last letter, I described the *external character* of the Giants Causeway pillars, which will abundantly serve to discriminate the *columnar* basaltic from any other fossil of a different kind, at present known. But as this species of stone does not always appear in its prismatical form, it will be convenient to take notice of some other properties, not immediately derived from its figure; by which, we shall be enabled to distinguish it, in those instances, where it may be disposed in more rude and irregular masses.

THE basalt of the Giants Causeway is a black, ponderous stone; of an uniform close grain, and hard texture; fusible and vitrifiable *per se*; and pretty strongly magnetical. It does not effervesce in any of the mineral acids; it is free from animal or vegetable exuviae, nor does it contain the slightest vestige of any organized substance whatever*.

THE *colour* of the stone, when immediately broken, resembles what is usually called an iron grey, the result of numerous little shining points spread through a dark ground: moisture, and the effects of weather, soon change this to a perfectly uniform black appearance; and long exposure to the air and rains, produces at length a superficial decomposition, usually attended with a brown colour, such as appears on the outside of the Giants Causeway pillars.

Irs

* I have intentionally confined this account to the stone of the *Giants Causeway*, because it seems as perfect in its kind as any hitherto discovered, and may in some measure serve for a standard with which to compare other stone of the same species.

COAST OF ANTRIM. 43

ITS mean *specific gravity* is to that of water in the proportion of 2,9 to 1,0; and its varieties of weight are included between 2,8 and 3,0.

WHERE the stone is fresh broken, *its grain*, attentively examined, exhibits somewhat of a fine crystallized appearance, dotted, as it were, with a multitude of minute shining points; by exposure to the air they soon lose their brilliancy and distinctness, so that an uniform and compact grain finally results.

Its *hardness* is sufficient for producing fire pretty copiously, by collision with a steel; and when a large fragment is struck with violence, in a loose position, it gives a clear, and as it were metallic sound.

THE *texture* is so close and equal, that a pretty high polish becomes necessary to shew several minute pores, and other inequalities of substance, which then a little disfigure its jet black surface. It is free from laminæ, fissures,

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fiffures, or any obvious irregularity of texture ; neither does it seem to possess any tendency to split or break in one direction rather than another*.

WHEN exposed to a moderate heat in a common fire, it assumes a reddish colour, (an effect resulting from the calcination of its iron) which is more vivid on its natural outside covering, and loses about $\frac{1}{50}$ part of its weight †.

IN

* This latter property, in any ponderous field-stone of a dark colour, usually procures it, in the northern parts of Ireland, and in Scotland, the denomination of *whin-stone*. Hence, this term, founded on properties a little too general, and common to other substances, is in its nature vague, and becomes applicable to fossils of very dissimilar qualities in different places : to basaltic in one county ; to kneifs and granite in another ; to a compact species of horn-stone in a third. It is, however, more applicable to basaltic, and therefore more generally given to it, than to any other species of stone through the counties of Antrim and Derry.

† This loss probably arises from water expelled by the heat. For in the course of twenty-four hours after, it will have nearly recovered its former weight, particularly if it be moistened.

IN a more considerable heat it readily melts, and is, as the chymists express it, *fusible per se*.

WHEN exposed to an intense fire it may be *vitrified*, forming an opaque glass of a black or blueish colour.

ITS principal component parts are iron in a metallic state, combined chiefly with siliceous and argillaceous earths.

ITS metallic principle may be demonstrated by a very simple experiment.—Let a small fragment of basalt, in its natural state, be brought into contact, or very near to a good magnetical needle, and it may be made to detain the needle at a considerable distance from its meridian. Let this fragment be touched by a magnet, and it will acquire a pretty strong polarity, capable of attracting or repelling the needle at the distance of an inch or more. From hence it is proved to contain iron in a metallic state, because the
calx

calx of that metal is incapable of producing any magnetical phenomena whatever.

To determine the quantity and quality of each constituent part, requires a very slow and laborious operation, which would be almost equally tedious in the description. I shall therefore just mention the result from the experiments of that able chymist, Sir Torbern Bergman, whose authority you will not readily question :

Bafaltes 100 parts.		
Contains Siliceous earth	-	50 parts.
Argillaceous earth	-	15
Calcareous earth	-	8
Magnesia	-	2
Iron	-	25
		<hr/>
		100
		<hr/>

FROM these elements we shall easily be enabled to account for several of its properties.

HENCE

HENCE it comes to pass that its specific gravity is so considerable, exceeding that of many stones, which, when polished, appear much more compact, the quantity of phlogificated iron easily making compensation.

WE see also why it answers so well for a touchstone, the hardness of its siliceous and iron particles easily rubbing and fretting off the parts of any softer metal which may be applied to it, and its black ground serving to display these to great advantage.

HENCE too arises its fusibility without addition; for though flint, clay, and calcareous earth are separately refractory, in any degree of artificial heat, yet when mixed together, they are readily fusible, and still more easily, when united with phlogificated iron.

FROM the metallic state of its iron element we are enabled to infer, *a priori*, that the columns of the Giants Causeway are all natural magnets, whose lower extremity is their
north

north pole, and the upper extremity their south pole. For having stood during many ages in a perpendicular position, they must have acquired that polarity which is peculiar to all iron substances in a similar situation; and like natural magnets, every fragment, when broken, will have its north and south pole. And this I have found true by experience; each pillar of the Giants Causeway, and each fragment of a pillar, which I applied near to the needle, having its attractive and repellent point.

HENCE likewise it follows, that the great capes of this northern coast must possess a similar property; and accordingly, in the semicircular bays of Bengore, I have often found the compass to deviate very much from its meridian.

THE magnetism of these capes may perhaps be an object of some curiosity; it might be well worth enquiring how far such masses of phlogificated iron, within the earth, may produce

produce those sudden and unaccountable deflexions of the needle, which are always inconvenient, sometimes so dangerous to seamen: And whether that still more mysterious and inexplicable phenomenon of the annual variation, may not arise from the gain or loss of the principle of metalliety, which in the slow and regular course of nature may possibly take place, by the various action of heat and moisture.

WE have proof sufficient, on a diminutive scale, that iron may, by variety of artificial means, lose or gain that principle on which alone its magnetical property depends; and the decomposition of the basaltic enables us to affirm, with reasonable certainty, that such changes do actually take place in nature, and that the magnetical phenomena of the promontory of Bengore for instance, must now be different from what they were some ages ago, or from what they will be some ages hence: It may, therefore, deserve consideration, how far this analogy could be pursued with respect to
the

the whole mass of the earth; particularly as we have evidence of the existence of a natural agent abundantly adequate to this effect, I mean subterranean fire, whose extensive dominion is indisputably proved by those numerous volcanos that have been discovered in so many distant parts of the world, the sources of which must lie at very considerable depths below the surface of the earth, if we may argue from the vast quantity of different substances that have been vomited forth in their various eruptions*.

FROM a knowledge of these elementary parts of the basalt, we are furnished with an analogy

* As it may be a desirable thing, to have the means of comparing the variation of the magnetical meridian from the true meridian, at some future period, with its present variation, on this northern coast of Ireland, a table is here subjoined for the year 1789.

The *places* noted, are situated beyond the limits of that country which contains the basalt. The *observations* were made by the pole star, and are duly corrected, where it did not chance to be on the meridian at the time of observation.

Clontarf,

analogy tending to throw some light on the regularity of its form. One of its principles is found to be filiceous earth; and we have very numerous proofs that this substance does, in other instances which come within our observation, frequently affect a regular figure, variable however under various circumstances. Thus, rock crystal, which is a very pure flinty earth, is commonly disposed in the form of hexagonal prisms, the denomination of fides which chiefly prevails among our basaltic pillars.—Thus again, variety of crystallizations are found to take place in the metal of glass-houses, where the furnace has been suffered to cool gradually.

IRON

Variation west.

Clontarf, near Dublin, at the distance of 60 geographical miles, or one degree of the meridian, on the south side of the basaltic country.

Sept. 29th, 1789—8^h 49' P. M. - - 28° 0'

Belfast, county of Antrim, at the eastern limit of the basaltic.

Aug. 8th, 1789—11^h 15' P. M. - - 26° 20'

Moville Bay, county of Donegal, a little beyond the western limit of the basaltic.

Aug. 18th, 1789—9^h 45' P. M. - - 29° 31'

IRON is another of the component principles of the basalt; and this metal is found to crystallize in regular figures, when all fit circumstances concur to permit the due arrangement of its parts. This is oftentimes discoverable in the ores of that metal, and may be observed to take place, imperfectly, even in our founderies, in what is commonly called the grain of cast iron, generally presenting to view a striated appearance: But in cases where the pains and ingenuity of the chymist has been exerted to exhibit this phenomenon more decisively, very regular cubical figures have been produced, clearly ascertaining the existence of this tendency toward a peculiar disposition of its parts.

IN truth, the particles of every substance in nature, appear to possess private laws and affinities, whereby they proceed to unite, and to arrange themselves in regular forms, when all things necessary combine to assist this tendency; that is, when by any means whatever, the particles are removed to a sufficient distance,

distance, and afterward suffered to approach slowly and regularly, according to their various laws of action.

Thus it appears to be, in the case of saline substances, which have been held in solution in a watery medium; for, if by the uniform evaporation of the fluid, or any other slow and regular cause whatever, time and space be allowed, in which the dissolved particles may exert, without disturbance, their private laws of affinity, these particles will be found to affect an arrangement peculiar to that species of body to which they belong. Thus again, all bodies that have been dissolved by the medium of heat, when suffered to cool equably, and without the rapid afflux of fresh portions of air, do universally exhibit a peculiar disposition of parts; of which, instances enough occur in every species of metal, in sulphurs, in glass, and, in short, in all substances capable of a perfect fusion.

SINCE

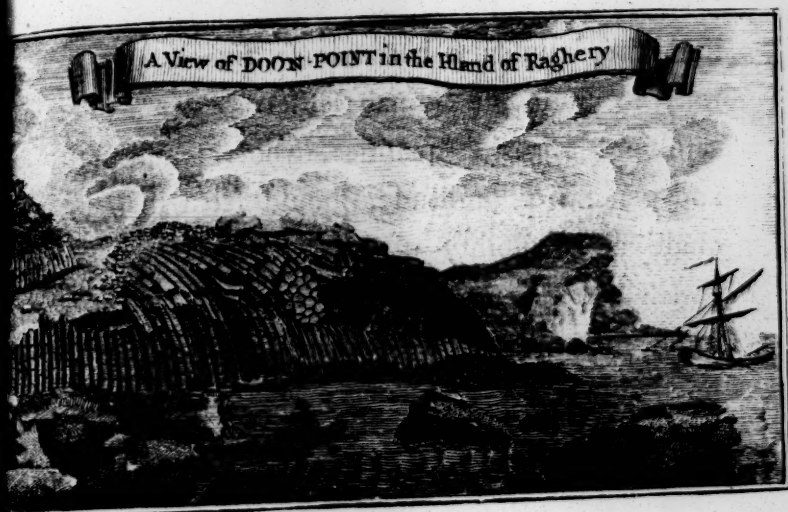
SINCE therefore we have sufficient evidence, in such instances as come within the reach of human powers and observation, that the elementary parts of the basalt do affect a specific form of crystallization; and that this form is always more and more perfect, in proportion as our experiments are made with greater regularity, and on a larger scale; it may not appear unreasonable to pursue the same analogy in the extensive operations of nature, where those laws, which are but imperfectly exerted in our diminutive experiments, may act with full and undisturbed vigour, capable of producing the beautiful symmetry and arrangement of a Giants Causeway. And though crystals have probably never been produced from any simple substance, precisely answering to the articulated basalt pillars; yet no very important objection can be derived from hence, since it is well known that elements, which, separately, form specific crystals, may, when united, constitute, by their compound laws, bodies different from either of the original specific figures. Thus,
melted

melted glass, through which scoriæ of iron had been accidentally mixed, was found to affect a columnar shape*.

THESE are the chief matters worthy of notice, which have come under my observation, with respect to the perfect basaltic of the Giants Causeway. In my next letter I shall mention some of the leading varieties of the different species of this stone; and at the same time, take that opportunity to give you a summary account, of the different fossils usually attendant on it, in these northern parts of Ireland; distinguishing, as far as may be in my power, such substances as seem to have been coeval with the basaltic, or in any way necessarily connected with it, from others whose connexion appears to be only casual, and whose existence may possibly have commenced antecedent to its formation.

* See Ker's observations on the crystallization of glass.—*Phil. Transf. vol. 65.*





LETTER IV.

DEAR SIR,

IT is an old observation, that each different species of being varies by such minute degrees, and passes, so imperceptibly, toward contiguous orders in the general scale of existence, that, like the mathematicians

N 2

line,

line, the boundary becomes so fine as generally to elude the human senses. Even separate and opposite qualities, whose simplicity, and general dissimilitude, should seem to preclude all possibility of confusion, do nevertheless, oftentimes approach so near, and assume such delicate distinctions, as renders it impossible to say, precisely, where either begins or ends.

LIGHT and darkness, pain and pleasure, when examined in their meridian vigour, seem incapable of confusion: yet, he who endeavours to mark the commencement or close of twilight; or to trace the fine and exquisite gradations, by which human sensations and ideas change, and imperceptibly assume a different character, often finds himself perplexed, and embarrassed by a doubtful limit.

THERE is scarce any pursuit, or science, which more frequently suggests this observation to the mind than mineralogy. The component parts of the objects which it considers

iders are so numerous; capable of being united in such an endless variety of proportions; subject to so many different forms and modifications from external causes, tending to assist or to impede the natural arrangement of the parts*; and possessing so many properties, resulting from principles, which scarce ever become the objects of human senses in their separate state of existence†, that, the best mineralogist often meets with substances, whose character and situation is so ambiguous, as naturally leads him into perplexity, oftentimes to error.

THUS,

* Among external causes may be ranked, heat, cold, fluidity, solution, diffusion in fluids, &c.

† Among principles, which can hardly be called the objects of human senses, may be reckoned such as, in their separate state, assume the character of airs, many kinds of which are probably incapable of confinement by artificial means: the principle by which iron, within certain degrees of temperature, possesses the property of magnetism: that, whereby the calces of metals become (as it is called) revived, &c. &c.

THUS, although the pillars of the Giants Causeway be marked by characters so strong, peculiar, and distinctive in their nature, as seems, at once, to separate them from every other species of fossil at present known; yet, where the columnar figure is faint and undistinguishable, where changes of colour, hardness, and texture have taken place; where casual circumstances have introduced varieties in almost all its properties, and in the proportion of its component parts; the boundary becomes of course uncertain, and it is in many instances impossible to pronounce, with accuracy, when the original character of the basalt has ceased, or where a new one commences.

FROM uncertainties of this sort it has happened, that the most acute and attentive mineralogists, have not perfectly agreed on the limits, within which, the species of the basaltic fossils shall be included; some wishing to extend the doubtful confine to a larger sphere, and to embrace within its circuit
the

the trapp of Sweden, the schwarzstein of Germany, the English toadstone, and a very extensive description of similar fossil substances, many of which may possibly have been produced by the operations of water*; whilst others, more conversant in volcanic products, have laboured industriously to contract these uncertain bounds, and to restrain the basaltes within the class of fossils which seem to bear probable marks of the effects of fire†.

IN truth, these two classes of fossils approach so near to each other, in the quality and proportion of their component parts, and in many of the properties thence resulting, as renders it exceedingly difficult to distinguish, with precision, between an imperfect specimen

* See Mr. Bergman's Letter to Doctor Troil.—Mr. Kirwan's Elements of Mineralogy.—Mr. Whitehurst's Strata of Derbyshire.

† See Mr. Ferber's Mineralogy of Derbyshire.—Mr. Faujas de St. Fond's Essai sur les Roches de Trapp.—Mr. Déodat de Dolomieu's Memoire sur les Iles Poncees, et les Produits de L'Etna.

men of the basalt, compared with the most perfect of the trapp; and it is only by a careful, and attentive observation, of the peculiar circumstances and situations wherein each is found, and the collateral fossils usually connected with them, that any reasonable expectation can be entertained, of determining the confusion which exists between these bordering fossil substances*.

It happens, fortunately for me, that the boundary of the basaltic parts of Ireland is so clearly to be ascertained, and the substances
both

* The first variety of the species of stone, denominated trapp, is thus described by Mr. Faujas.—“ Trapp, noir, “ homogène, dur, donnant quelques étincelles avec l’acier, “ et faisant mouvoir le barreau aimanté; point d’effervescence avec les acides, fusible sans addition, et formant une terre plus ou moins poreux, plus ou moins coloré, en raison des diverses parties constituantes de la “ pierre.”—See *Essai sur les Roches de Trapp*, page 81.

Whoever will compare this with the definition of the basalt, (*see page 42, part 2d, of these letters*) will find a degree of similitude, which, in the comparison of two specimens, must naturally perplex the best mineralogist.

both within and without this limit, so well defined, and so dissimilar from each other, as to give me hope, in the midst of this general uncertainty, that I shall be able to fulfil the promise which I made in the conclusion of my last letter, of enumerating the principal varieties of the basaltic and its attendant fossils, without the danger of entrenching on mineralogical property, to which I have no claim. By this means, I shall have an opportunity of submitting to your own impartial judgment, the best method which remains, of settling this doubtful mineralogical question concerning substances, whose elementary principles, and general properties, oftentimes bear a most perplexing resemblance.

I AM well aware of the ill success, which usually attends mere topographical description, even where the objects are in their nature the best adapted to excite and engage the attention; for this reason I have accompanied my letter with a map, including a considerable portion
of

of the northern province of Ulster*. On this, I must request, that you will patiently travel round the basaltic country of the north of Ireland, and endeavour with me to trace out and examine its nature and extent; without which assistance, it is likely, that the best description I could give, would produce little else than perplexity and dissatisfaction.

A COAST, generally mountainous, and remarkably abrupt, forms its northern limit: on this side it is washed, for the space of fifty miles, by an ocean whose tides are rapid, and its surface tempestuous.

THE mountains of this coast are wild, and savage in their appearance; yet neither remarkably elevated, nor uncommonly irregular in their outline. Their most general character consists in an abrupt and precipitous termination at one extremity, with one or more
gradual

* See map at the beginning of this work.

gradual descents, stretching from thence in the manner of lengthened banks*.

THE broad and navigable estuaries of Carrickfergus and Foyle, washing the eastern and western shores of this country, form a decided barrier on these two sides, and separate it entirely from the neighbouring coasts of Down and Donegal: whilst an irregular line, skirting the mountains behind Belfast and Lisburn; including the southern shores of Lough Neagh, as far as the vicinity of the village of Market-hill; passing near to Stewartstown, Moneymore and Dungiven, and thence, stretching along the base of the Londonderry mountains, which terminate at the lofty cliffs of Magilligan, marks its southern limit; and completes a boundary, which, taken in its
entire

* Generally speaking, the precipices are situated toward the sea, whilst the more gradual descents tend toward Lough Neagh, whose surface is not elevated more than thirty eight feet above the shores of this mountainous coast.

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entire course, amounts to a circuit of about an hundred and thirty geographical miles*.

THE substance which most readily arrests the attention, and directs the eye, throughout this extensive tract, is a species of white limestone, sometimes imperfectly chalky, usually filled with nodules of flint. This stone may be observed at frequent intervals through the circuit, and generally, as it were, emerging from beneath the incumbent beds of basalt.

A low foil, sometimes marshy, but more commonly sandy, bearing on its surface rounded field stones, and hills of gravel, succeeds to this boundary of the basaltic country †.

BEYOND this uncertain foil of water-worn substances, fossils of various kinds, and unambiguous

* Sixty geographical miles, or a degree of the meridian, are nearly equal to $54\frac{1}{2}$ Irish miles.

† Except for the space of ten miles, where mountains adjoin, in the county of Londonderry.

biguous characters, soon start up in every direction through the neighbouring parts of Ireland. Limestones and marbles, of peculiar colours and distinctive texture; shifts of different hues, properties, and degrees of coarseness; metallic veins of lead, silver, copper, and iron ore; beds of sandstone, slate, and pit coal; extensive masses of granites, kneifs, and different siliceous substances, with a more minute variety of numberless other fossils, arise in succession, forming all around, a new and totally dissimilar country.

To detail these various substances, by a more precise description of their different species, and local situation, would be foreign from my present purpose. I shall therefore hasten within my proper limit, and endeavour to fulfil my promise, by enumerating the *varieties of the basalt*, and its *attendant fossils*, with as much accuracy as a brief description will permit*.

WITH

* To avoid error and confusion, it should be observed, that the term *basalt*, when generally mentioned, in these letters,

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WITH respect to *colour*. The internal substance of the Giants Causeway stone is an iron-grey, approaching toward the appearance of a deep black. The varieties of colour in the basaltés are blue, ferrugineous, brown and grey,

letters, is designed to express every species of stone, through this northern country, which contains the same elementary principles in its basis, as the Giants Causeway basaltés, and bears any similitude to the exterior character of that substance. Instances may be found, where parts, even of the columnar stone, are reduced by decomposition, or other means, to a state very little different from that of the most imperfect and amorphous basaltés ; so that the term cannot with convenience be taken less extensively.

Foreign writers generally describe the basaltés, and its varieties, as compact lava, and its varieties ; without taking sufficient pains to demonstrate that they are one and the same species of fossil. So long, however, as it shall remain problematical, in any country, whether the basaltés be a volcanic production ; or, at least, so long as any difference shall be found between the basaltés, and the lavas of the present age, it cannot be thought improper to retain a specific and separate name for each production.

The term *whinstone*, as applied to the harder varieties of the basaltés ; and the name of *rotten-rock*, as describing the most friable and perishable species, includes all the distinctive names commonly used in the county of Antrim for every kind of this stone.

grey, chiefly resulting from the various states of dephlogistification of its iron element. Instances occur in some of the highest mountains, where it has become superficially white, by a perfect loss of that principle.

WITH respect to *weight*. The proportion of the specific gravity of the Giants Causeway stone to that of water, rarely exceeds the ratio of 3 to 1. The lightest stone of the species possesses twice the specific gravity of water; and the varieties of weight in the basaltes lie between 2 and 3.

WITH respect to *hardness*. The perfect columnar stone possesses a degree of firm cohesion, sufficient for producing sparks of fire by collision with a steel; and when violently struck in a loose position, emits a clear metallic sound; but the amorphous basaltes usually varies from this degree of hardness, down to the loose, and friable coherence, of a clay imperfectly baked.

WITH

WITH respect to *grain*. The perfect species of columnar basalt, exhibits the appearance of a fine and uniform surface. The gross pillars of Fairhead approach toward the semblance of an exceeding close imperfect granite. The amorphous stone of this species possesses considerable variety in its grain, oftentimes exhibiting opaque crystals of black schorl, sometimes of yellow crysolite, and less frequently, brilliant points of a sapphire colour. These colours are soon weakened and destroyed by exposure to air.

WITH respect to *texture*. It should be observed, that, though the Giants Causeway stone be, in general, compact and homogeneous, yet, the upper joint of each pillar, where it can with certainty be discovered, is always rudely formed and cellular. The gross pillars also, as well as the table basalt, in the capes and mountains, frequently abound in these air-holes, which generally contain crystals of zeolyte, sometimes calcarious spar, brown or whitish steatites, and other apparently foreign

foreign bodies *. In the most imperfect and amorphous stone of the species, approaching nearest to a state of entire decomposition, these heterogeneous substances seem to constitute a large portion of the entire mass of the basalt †.

WITH respect to *specific crystallization* and *accuracy of form*. The pillars of the Causeway are prisms, of 3, 4, 5, 6, 7, or 8 unequal sides; the hexagonal columns being the most numerous, the triangular and octagonal pillars occurring very rarely. They are regularly divided into joints, neat
O in

* Where these substances have been washed away, or otherwise destroyed in the basalt, a stone results, much resembling, in its general appearance, the *toad-stone* of Derbyshire.

† This species of amorphous spongy basalt, speckled with zeolyte, calcarious spar, differently coloured argill, &c. appears to correspond with the *peperino* of Messrs. Pazumot, Le Sage, and others. It is known in the county of Antrim by the name of *rotten-rock*, from its friable and perishable nature.

in their articulation, with a concave or convex termination to each. At Fairhead the pillars are extremely gross, rudely formed, and not generally divided into joints. Among the imperfect crystallizations on various parts of the coast, the basaltes may occasionally be found to separate into a greater variety of polyedron figures; but in instances of this sort, the general symmetry, and perfection of the crystallization, is far inferior to that which the Giants Causeway exhibits.

THROUGH the country this species of stone frequently lies in thick beds; and in this state often separates into loose blocks, resembling the fossil known in Sweden by the name of Trapp*: but most usually, the basaltes is entirely amorphous, disposed in gross masses, which

* This is a name, casually given to a species of stone similar to basaltes, in consequence of its disposition in successive beds resembling a flight of stairs.

which do not split or separate in any assignable direction.

WITH respect to *disposition* and *arrangement*. At the Causeway, and most other places, the pillars stand perpendicular to the horizon: In some of the capes, and particularly near Ushet in the isle of Raghery, they lie in an oblique position; at Doon Point in the same island, and along the Ballintoy shore, they form variety of regular curves.

THE little point of Doon is indeed extremely curious, containing at once perpendicular, horizontal, and bending pillars *. Its base resembles a mole composed of erect columns, like those of the Giants Causeway; above these, others appear in a bending form, as if they had slid over in a state of softness sufficient for their accommodating themselves to the course of their descent, and thus had assumed the figure of various curves, in con-

O 2

sequence

* See an engraving of it at the beginning of this letter.

sequence of the action of gravity. Over all, groups of pillars are disposed in different horizontal positions, with that amusing variety which one often observes in the crystallization of saline substances, exhibiting at a single view, almost every variety that is to be found in the disposition and arrangement of the columnar basalt.

WITH respect to *situation*, the pillars at the Causeway stand on the level of the beach, and even under the surface of the ocean, from whence they may be traced through all degrees of elevation, to the summit of the highest grounds in the neighbourhood; as at the old fort of Dunmull, and on the top of Croaghmore, six or seven hundred feet above the level of the sea.

WITH respect to *magnitude*, the perfect pillars of the Causeway are usually about a foot and an half in breadth, and thirty in length. Among the imperfect and irregular crystallizations

stallizations through the country, small prisms may sometimes be found, which do not exceed a few inches in breadth, and whose length is proportionably diminutive. In many of the capes and hills, the size is much larger than that which occurs at the Causeway. At Fairhead they are of a gigantic magnitude, oftentimes exceeding five feet in breadth, and two hundred in length.

OF these vast columns, the passage usually called *Fbir Leith*, or the Grey Man's Path, in the promontory of Fairhead, exhibits a magnificent example*. It is a deep chasm, dividing the solid promontory in twain; the upper termination of this singular passage is narrow, and barred over, as it were, by the fragment of a pillar, which, having fallen across the fissure, remains supported at an elevated situation. As one descends, the chasm widens, and becomes more important; its

* See engraving, page 37, part II.

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its solid walls of rude and threatening columns encrease in height, regularity, and magnificence, until they attain to a perpendicular elevation of two hundred and twenty feet, conducting the passenger at length to the interesting heap of massive ruins, which form the base of the promontory itself, and exhaust the fury of the impetuous northern ocean.

SUCH is the apparent solidity of this body of rock, and such the extreme hardness of its texture, which scarce shews, even at this day, the slightest marks of decomposition, that, one would naturally suppose it fitted to maintain itself firmly for ages, against every element of destruction. But, beneath this appearance of massive strength, and invincible durability, it contains circumstances which render it extremely subject to ruin.

AT a depth of two hundred and fifty feet from its summit, this solid precipice of iron
rock,

rock, rests on a feeble base of crumbling slate, and other substances indicating the vicinity of a bed of sea coal: this, though equal to the support of the superior mass, whilst, firmly connected in all its parts, the weight continues perpendicular and uniform, yet readily yields to any irregular pressure from above, and becomes altogether unequal to its burthen. The colossal pillars themselves, which form the precipice, though closely and intimately arranged together, are nevertheless, still to be considered as separate columns, capable, in many instances, of affording a passage to the rain which falls on the top of the promontory, and insinuates itself deeply between the fissures. In severe seasons this water becoming converted into ice, and encreasing its dimensions with irresistible power, during the time of congelation, widens the interval between these pillars, and by successive operations of this sort, so enlarges the fissures, as to produce a very irregular pressure on the frail foundation beneath: in consequence of which
the

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the solid incumbent mass is oftentimes shaken from its place, and huge bodies of rock detached, with inconceivable violence, down to the foaming ocean.

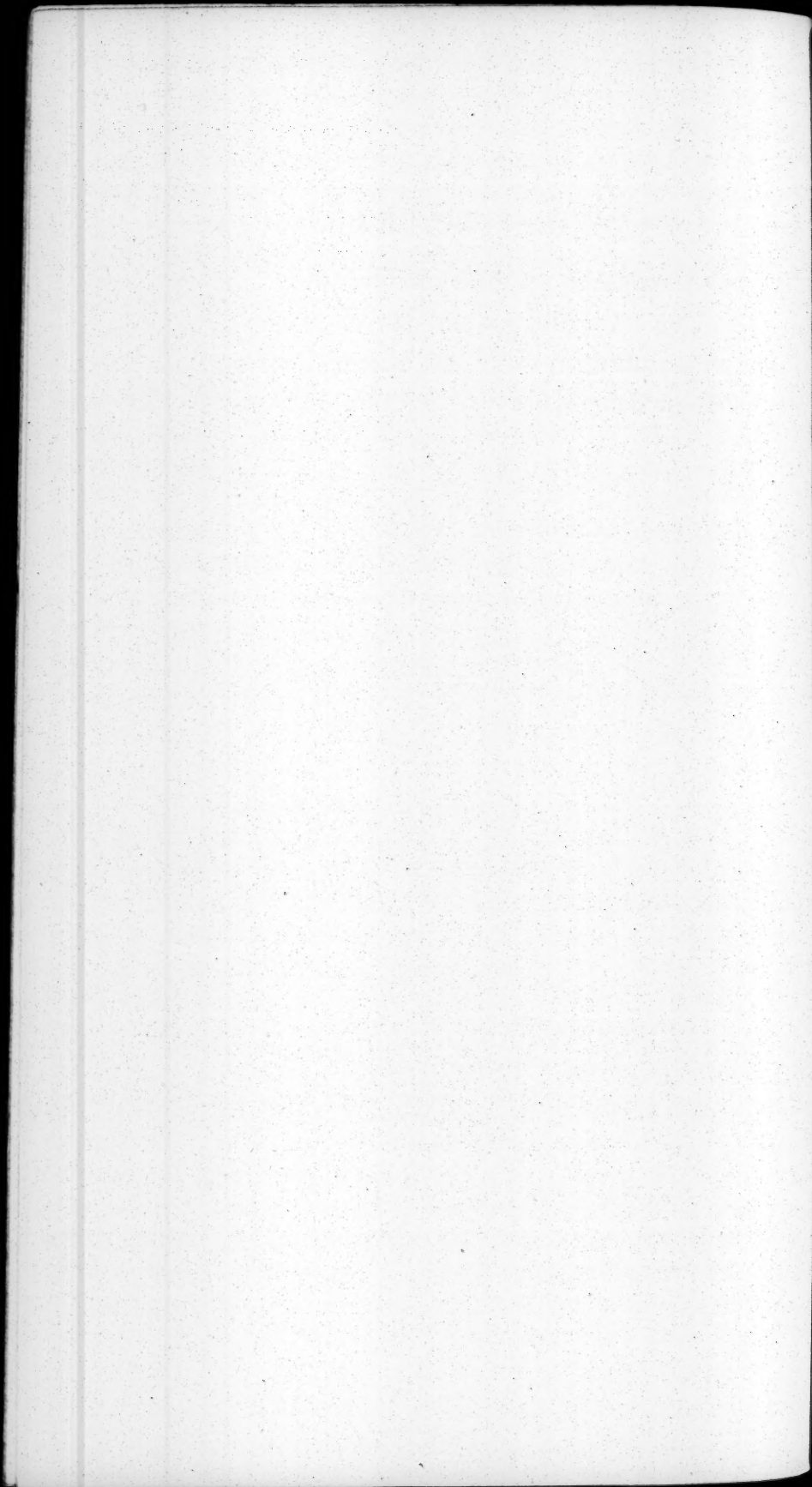
AN instance of this sort occurred, a few winters ago, on the eastern side of the promontory, which has left marks of its fury that will not be effaced for several years; and has buried a thousand tons of coal beneath its ruins, so effectually, that no attempt whatever is made to recover them.

THE colliers, whose mine lay in the vicinity of the precipice, were fortunately at a distance during this period of destruction, which happened in the night; and in security, awfully beheld a scene, corresponding only with their imaginary idea of the dissolution of the earth itself; wherein thunder, clouds of dust, and shivered fragments of stone, traversed by vivid flashes of light, (the horrid compound which resulted from

from the collision of these monstrous rocks ;) conspiring with the natural terrors of midnight, formed a scene of horror they yet faulter in describing.

I remain your's.

LETTER



L E T T E R V.

DEAR SIR,

I Had hoped that my last letter would have been the final test of your patience, and that the arid and encumbered course of mere mineralogical enquiry, might there have terminated. The unexpected size to which that letter encreased, has disappointed these hopes ; and obliges me, unwillingly, to devote another sheet to the same ungrateful subject.

It is, however, some satisfaction, that we are no longer chained down to the tedious examination

nation of a single species of fossil, hitherto unprofitable for the use of man; but that our remaining enquiry may lead us to the knowledge of others, which have been successfully applied to human purposes; many of these too deriving their existence from the changes and modifications of that very substance, so unproductive and unpromising in its original state.

Iron
Ores,
Hæma-
tites.

IN the basaltic precipices, it is not uncommon to find thin strata of rich iron ores, of that species usually called *hæmatites*. They are most generally formed amid beds of red argillaceous ochre, probably by the gradual filtration of water through these beds, which are themselves pretty rich in iron. Other varieties, resembling what are usually denominated *bog ores*, occur in greater abundance: these latter seem to owe their existence to an accumulation of particles of iron washed down from more elevated situations by the rains; this species of ore is found chiefly
on

Bog
Ores.

on the sides of mountains and in the vallies*.

Ochres of several colours prevail amid the *Ochres*. basaltic beds, through different parts of the country. The predominant colour is red, varying from a dull ferrugineous hue, to the intensity of vermillion. There is much argill generally intermixed with these calces of iron; instances however occur, where they are sufficiently pure to answer for the purposes of coarse paint. The capes of Bengore, and other similar precipices of the country, exhibit most of the varieties of these ochres at a single view.

A HARD and firm substance, resembling *Basaltic* *Cinder*.
basaltes which had suffered a degree of fusion
approaching

* In the beginning of the last century, when wood fuel was extremely abundant in Ireland, this latter species of ore was extensively wrought in the county of Londonderry. To the iron works of that age, the rapid destruction of the forests of Ireland is chiefly to be attributed. (*See Nat. Hist. of Ireland, A. D. 1650.*)

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approaching toward vitrification; extremely cellular, sharp and cutting in its feel, of a specific gravity little superior to that of water, and of the character of a *basaltic cinder*, is sometimes (though I think but rarely) found on the shores of the island of Raghery*.

Pouzzo-
lana.
Terras.

FROM shivered fragments of the hardest columnar stone, in consequence of its joints falling asunder and rolling down precipices; from quantities of angular gravel into which the irregular basaltes often separates, at the commencement of its decomposition; and from finer and softer particles of the same stone more perfectly decomposed; a compound gritty powder results, much resembling the *pouzzolana* of Italy, or the *terras* of the Canary Islands. With proper attention, this basaltic substance

* This substance was described, in the first edition of these letters, as a black pumice stone. On consideration I am apprehensive that the term may be incorrectly applied, as pumice is generally fibrous as well as spongy, and is probably produced by a peculiar operation; for which reason another name is here substituted, better adapted to the fossil described.

substance might be serviceable for the same important purposes as those volcanic products, in submarine buildings, and other works exposed to constant moisture.

THE elementary principles, which abound *Clays*. most copiously in the basaltcs, are the siliceous, ferrugineous and argillaceous earths. From the decomposition of this species of stone therefore, an extensive tribe of *clays* are necessarily produced, varying indefinitely in colour, tenacity, fusibility, and other properties, according to the casual proportions and affections of their component elements*.

THESE

* As the argillaceous earth is less abundant in the compact basaltcs, than either of the other principles, it may at first view seem incorrect to apply the term *clay* to the resulting compound, wherein other substances may chance to be more predominant.

To this apparent impropriety, Mr. Kirwan supplies a sufficient answer, which cannot be expressed in clearer terms than his own.—“ When simple earths, belonging to different genera, are combined together, I generally place
“ them

THESE clays exhibit a great variety of colours, black, blue, brown, ferrugineous, red, yellow, grey, effects arising from the different proportions of iron which they contain, and its various states of phlogification: In the black and brown clays, the iron approaches nearest to a metallic state; and in the yellow it is probably most imperfectly phlogificated*. Their tenacity depends on the proportion of argill which they may contain; and their friability on the quantity of siliceous matter; such properties being among the distinctive

“ them under that genus of which the compound contains the largest proportion: yet not always; for if the compound possesses the peculiar characters of the component part, which is in a smaller proportion; or if it attracts the attention, and is subservient to the uses of mankind, merely on account of the less copious ingredient, I range it under the genus of that ingredient. Thus, though common clay contains much more of *siliceous* than of mere *argillaceous* earth, yet as it possesses smoothness, viscidness and softness in a high degree, it would appear improper to place it under the *siliceous genus*, whose characters are the very reverse.”
(See *Elements of Mineralogy*, p. 20.)

* See Mr. Kirwan's *Elements of Mineralogy*, p. 77.

distinctive characteristics of these primitive earths.

OF these clays is formed the *original soil* ^{Vegetable Clay.} of the country: in this state it is unkindly and sterile; but when meliorated by lime, which may be derived abundantly from the subjacent calcarious stratum, and is now generally used, it becomes sufficiently rich and fertile for all the purposes of agriculture. There are probably few spots in Europe, where the application of lime to the natural argillaceous soil, is more universally, or more successfully used, than in the mountainous county of Antrim.

INDEPENDENT of these varieties of argillaceous substances, that are adapted to form the vegetable soil of the country; other modifications not unfrequently occur, which render them useful in arts and manufactures. Thus a species of clay, of a blueish, brown, grey, or yellowish colour; unctuous to the touch, diffusible in water, conchoidal in its
P fracture,

Fullers
Earth.

fracture, apparently adapted to answer for some of the valuable purposes of *fuller's earth*; may be found in some parts of the country*.

Apyrous
Clay.

WHERE the argillaceous and flinty earths predominate in a great degree, with but an inconsiderable admixture of calcareous and ferrugineous particles, a light coloured blueish clay results, which by the operation of fire assumes a reddish grey hue; this substance is of a quality sufficiently refractory, to be useful in many of the manufactures wherein *apyrous clays* are necessary.

Fusible
Clay.

AGAIN, where the iron chances to be superabundant, fusibility becomes a property of these clays; and the more so, if by any means a considerable quantity of calcareous particles happen to enter into their composition.

* Favourable reports, concerning the use of this earth in woollen manufactures, have been laid before the Dublin Society by reputable manufacturers of this kingdom.

fition. Hence, *fusible clays* are abundant through this country.

FINALLY, different combinations of argil-^{Steatites.} laceous and filiceous earths may be discovered, of a greenish, grey, or whitish colour ; smooth and unctuous to the touch ; of a saponaceous appearance ; often capable of producing a froth by agitation in water ; and resembling the *steatites* of Cornwall. These varieties of the *steatites* are most usually to be found in the cells and cavities of the irregular basalt^{*}.

IN instances where the filiceous, or flinty ^{Petro} earth, is superabundant among the basaltic ^{Silex} fossils, and therefore by its superior quantity

P 2 determines

* This substance is denominated by the peasants of the country *rock grease*, in consequence of its unctuous and soapy appearance ; and is esteemed to be of singular use in medicine, and in the cure of sores. As an argill capable of absorption, it may be of some utility ; at all events the opinion of its efficacy prevails, pretty generally, among the lower ranks of people through this part of Ireland.

Rock
Crystall.Chalce-
dony.

determines the character of the substances into which it enters, varieties of *petrofilex* may be found, but not in great abundance. Amid the fissures of basalt, small *crystallizations* of flinty earth sometimes occur; at other times it is disposed in thin laminæ, assuming an appearance much resembling *chalcedony*.

Calcare-
ous Spars,
and
Incrusta-
tions.

As calcareous earth is but a scanty ingredient in the principal fossil of the country, (I mean in the basalt) it may naturally be expected, that, modifications of this substance will not be very frequent among the attendant fossils. In some places, however, *calcareous spars* and *incrustations* take place, amid the fissures of the basalt; and in the cells and cavities of that stone, *crystallizations* may be found, particularly, near to situations where the spongy basalt has overrun the subjacent limestone stratum.

Gypsum
Alabaster.

AMID the banks of clay, it is not very uncommon to find calcareous earth united to the vitriolic acid, deposited in strata of *alabaster* through

through the argill. Its colour is generally a bright white, sometimes a little soiled with iron; its form of crystallization is usually in parallel fibres; the strata are rarely of any considerable thickness. This substance is found to answer for most of the purposes of stucco, &c. equally well as the foreign *gypsum*.

IN the cells and cavities of the basalt, *Zeolite*. *zeolyte* may frequently be seen, in masses varying in weight from a grain to a pound. Its colour is generally a bright white, occasionally tending toward a greenish hue. Its most general form of crystallization is fibrous, the rays diverging from a common centre, and forming a compound resembling the delicate texture of thistle-down. It may be found also in other figures of crystallization, as for instance in regular cubes. It generally produces a gelatinous mixture with the nitrous acid. The zeolyte of this country is most copious in the spongy and softer varieties of the basalt; but may be seen also in the compact,

paçt, and even in the columnar stone of that species.

ALL these fossils, which I have here enumerated, bear the character of an existence coeval with that of the basaltcs itself; or of having been gradually produced, at a period subseqnent to its formation. They are either sunk within its cavities, or formed between its beds and fissures, or finally, deposited on its surface; constituting in every instance, a part of the general superior substances of the country, and no where, as far as I can recollect, bearing the character of a separate and independent existence.

ANTECEDENT to the formation of this extensive tribe of fossils, other substances, dissimilar in their nature, and different in their disposition and arrangement, constitute the subjacent soil of the country; and from their relative situation seem naturally to claim a priority of date.

OF these, the substance most extensive in quantity, and most remarkable in its appearance, is the *white limestone*, which, at the limits of the basaltic country, frequently shews itself emerging from beneath the incumbent beds of basaltic fossils. In colour it resembles chalk, but in hardness exceeds it, except in the vicinity of the basaltes, where it is sometimes soft and friable. Like chalk it abounds in irregular nodules of flint, which are generally dispersed through its whole substance.

As, a negative character of the basaltes, was derived from its total want of all vestiges of animal or vegetable exuviae, seeming to indicate, that it was not formed by any gradual deposit from a watery medium; so a positive character, arising from the same source, attends the limestone. Belemnites, asteriæ, and shells of the pectinite species, are dispersed through it; the first of these more frequently than all the others:

others: but, generally speaking, these marine exuviae are not extremely abundant.

THE original elevation of this substance may perhaps have exceeded a thousand feet*; and it is discoverable through all inferior degrees of altitude, until it becomes lost beneath the ocean.

THE primitive disposition of its strata seems to have been horizontal; but this question cannot now be determined with facility, as they bear at present visible and extensive marks of confusion and displacement. These irregularities appear chiefly to have arisen from the formation of the incumbent basalt, the limestone being generally much deranged in the neighbourhood of that stone, where it is imperfectly columnar; and hardly any instance

* In the mountain of Knocklaide, near Ballycastle, it may be seen at its greatest elevation. Along the coast of Glenarm also, at the mountain of Benbredagh in the county of Londonderry, and various other places, its height is very considerable.

stance occurring, where it has not vanished, altogether, from beneath the perfect pillars.

IN particular situations, this limestone appears to have undergone a gradual change of texture, insensibly softening, and finally ending in the state of aggregation of a friable sandstone. In the instances of this sort, wherewith I am acquainted, a phosphorescent property accompanies this change; and the dust, or sand, when sprinkled on burning coals, or a hot iron, in a dark situation, exhibits for a short time, a vivid yellow light. During this process it does not emit a sulphureous smell; neither does it discolour the nitrous or vitriolic acids by solution*.

Instances

* The sandy texture of this substance might lead one to suppose, that it had been originally formed of water-worn grains cemented together; but the gradual change of the white limestone into this substance, together with an instance of marine exuviae contained in it, seems to preclude this opinion, and renders it more probable that some local circumstances have altered the original limestone into this state.

Instances of this singular, and hitherto non-descript calcareous substance, occur in the isle of Raghery; in the peninsula, called Island Magee; and in the neighbourhood of Larne. The phosphorescent property of the Raghery stone seems to be superior to that of the other places.

Nodules
of grey
Flint.

DISPERSED irregularly amid the substance of the white limestone, nodules of dark flint shew themselves in considerable quantity. They are externally covered with a white filiceous crust; but internally exhibit the appearance of a dark grey colour, and when broken into small fragments possess an imperfect transparency. Oftentimes they contain cavities, which are occasionally filled with a white filiceous powder, extremely fine, and impalpable to the touch. The same species of marine exuviae that are observed amid the limestone, may sometimes be seen in the flints also.

WHERE

WHERE these flinty nodules chance to be situated at the contact of the basalt with the subjacent limestone, they appear to have undergone a very material change. They lie detached in abundance from their original matrix, sometimes imbedded in the basalt itself, but more generally tumbled through a loose and heterogeneous intermediate stratum. In these instances their texture is frequently changed, they have lost their original hardness, and are become brittle and shivered; their grey colour and imperfect transparency is oftentimes destroyed, and instead thereof an opaque milky or yellow whiteness appears. These and various other changes seem to mark the effects of a process resembling calcination, generally imperfect, but sometimes complete.

BESIDES these alterations, another, more difficult to be explained, is generally to be seen in similar situations; the flints detached from their original limestone bed, are often tinged, through their whole substance, with beautiful varieties of a red colour; from a faint and vanishing

White
calcined
Flints.

Red
Flints,
Jasper.

vanishing pink hue, to a bright and uniform vermillion. These colours are to be attributed to calces of iron contained in the flints, in that peculiar state of dephlogification, which is always attended with appearances of this sort: and the calces themselves, may be supposed to have resulted from the iron of the basalt, in the vicinity of which the coloured flints occur tumbled through a loose mass, which abounds in an impure ochre derived from the incumbent stone.

THE quantity of this heterogeneous mass of ochre, combined with argill, calcareous earth and siliceous fragments, through which the flints are irregularly jumbled, differs in different situations, varying almost from nothing to a thickness of twelve feet or more. Its substance is generally so tender and perishable as scarce to bear the touch, and therefore in abrupt precipices cannot be approached with safety.

SUCH

SUCH heterogeneous strata, and the general effects attending the contact of the basaltcs with the inferior bed of limestone along the entire coasts of Antrim and Londonderry, afford phenomena extremely interesting to the mineralogist, and peculiarly worthy the attention of any person who may wish to investigate the natural history of the basaltcs*.

I HAVE given you a summary, of the principal varieties of the basaltcs, and its attendant fossils, through a tract of more than seven hundred square miles, in these northern counties
of

* Besides the substances that have been already enumerated, and which form the general and characteristic features of this entire country, a few others still remain, whose comparative quantity is but small, and their situation purely local. Of these the principal varieties will be found in the cliffs that form the eastern side of Ballycastle, and in the country from thence to Newtown Glens. Grey, yellow, brown and red siliceous sandstone; shale or shivered black slate; pit-coal, (*see Letter 3, Part 1st, of this work*) kneifs, imperfect granite, and a sort of pudding-stone, will be found to include almost every additional species which occurs any where within the basaltic limits.

of Ireland wherein it is found; and as I should be extremely sorry to think that you had the trouble of reading this letter, only for the unprofitable labour of learning uncommon names, (which would certainly be the case did this account terminate the subject;) I shall, in my next letter, candidly apply such arguments, as can be derived from the nature and properties of these fossils, to explain the volcanic theory of the production of the basalt: at the same time however, I hope to be able to state, with equal honesty, such objections as seem most substantially to militate against this favourite hypothesis—leaving it to your own excellent judgment to decide on a subject, where, as Sir Roger de Coverly would observe, “much might be said on both sides.”

LETTER VI.

DEAR SIR,

THERE are few things that can affect a contemplative mind with more surprise, than the numerous and signal changes which appear to have taken place, in the form and arrangement of our earth, at some very distant age. It is a subject which has at all times engaged the attention of mankind, and certainly constitutes the most interesting department of natural history.

FROM the frequent and unequivocal vestiges of marine productions, that are found
in

in the midst of our most extensive continents, and on the summit of several of the loftiest mountains, some philosophers have been induced to attribute the formation of the present habitable world, to the violent and tumultuary fury of the ocean, agitated by some uncommon cause *: Whilst others have thought, that the gradual, but unceasing efforts of its heaving billows, were abundantly adequate to account for these appearances on more common principles †.

BUT variety of natural phenomena occur to an attentive observer, which are deemed incapable of being reasonably explained by these hypotheses; whether we regard the general features and elevation of many of our continents, or the nature and situation of the fossils which they contain.

HENCE

* Burnet, Whiston, Woodward, &c.

† Buffon, &c.

HENCE it has come to pass, that a new and more powerful principle, esteemed entirely equal to those effects, has been adopted; and many of the most surprising phænomena of nature, are held to be explicable by the potent agency of subterranean fire.

To this latter cause, the formation of our pillars of basalt has been attributed, with some appearance of probability; and though much has been said on this subject with vagueness and indecision, concerning the manner of their production, yet, the principal facts that have been adduced in favour of the general opinion, are well worthy of attention, and open to view a very novel and important object of enquiry.

THE first person who took a decided part in favour of the volcanic theory of the basalt, was Mr. Desmarest, a French gentleman, whose Memoire on that subject may be seen in the publication of the Royal Academy of Sciences for the year 1771. Mr.

Q

Desmarest,

Desmareft made a tour through the county of Auvergne, one of the fouthern provinces of France, in the neighbourhood of the Rhone; where he difcovered many piles of bafaltes, with more variations of magnitude, figure, and arrangement, than was at that time known about the Giants Caufeway in Ireland. By his means a geographical furvey was made of this part of France, and a map delineated, wherein the direction of the mountains, and the fituation of its bafaltes, were fupposed to be accurately projected.

FROM this máp, and his own perfonal obfervations on the nature of the foil, and the general fpecies of its foſſils, he conceived that this country had once been ravaged by fubterranean fire, of whoſe waſteful dominion undeniable veſtiges ſtill remained; and that the bold inequalities of its ſurface, its hills and vallies, were formed by vaſt heaps of ſcoriæ, and different melted ſubſtances, which had iſſued from its volcanic mountains, ſpread-
ing

ing themselves in every direction from these flaming centres.

He imagined also, that many of these melted torrents might be traced through their whole extent, from the side of the great volcano which gave them birth in the mountains of D'or, to their remotest extremities, where they terminated in banks of prismatical basalt. From all these circumstances he concluded, that the basaltic columns were formed by the gradual refrigeration of a mass of fluid lava, during its flow and retarded progress over the subjacent soil; and that most of its varieties of shape and situation, might naturally be attributed to the different interruptions of its course, or to the alterations introduced by the successive ravages of volcanic fire*.

Q 2

AFTER

* A mesure qu'on parcourt ces Cantons, en faisant la recherche & l'énumération des masses prismatiques, qu'on étudie les courans, sur-tout vers leurs extrémités, qu'on suit leur marche depuis le centre des éruptions, leur enchainement

AFTER Mr. Desmarest, many writers, both foreign and domestic, pursued this interesting subject with great ardour. Among the English authors we are principally indebted to the labours of Sir William Hamilton, whose valuable collection of facts, relating to those places which are, at this day, the seat of living volcanos, afford the surest rules of judgment, concerning such countries as do yet bear strong marks of a volcanized appearance, without any direct evidence of the existence of subterranean fire.

BUT the person to whom we owe the most ample compilation of materials, immediately

enchainement & leur distribution à la superficie des plaines hautes qui séparent les vallons, qu'on détermine leurs limites, qu'on examine les différentes espèces de pierres dont ils sont composés, on reconnoit à chaque pas que ce sont des-hors d'œuvres établis sur le sol naturel. On distingue les produits du feu des substances intactes, & l'on apprécie en même temps les transports immenses des matières fondues, dont les prismes sont toujours partie.—*Desmarest sur l'origine & la nature du Basalte, see Memoires of the French Academy for the Year 1771.*

diately relating to the basaltés, is Mr. Faujas de St. Fond, who has lately published a voluminous work on the extinct volcanos of Viverrais and Velay, counties adjoining to Auvergne, which had before been described by Mr. Desmarest. In this work, the author has given a particular memoir on the basaltés, to which he has annexed descriptions, and engravings of the most remarkable banks, and mountains of basaltic columns, in these districts of France. But his work is rendered still more valuable, by the minute and accurate accounts which it contains of the attendant fossils, particularly the zeolyte, schorl, and pouzzolane earth; because we are from thence enabled to decide, whether these substances be universally connected with the basaltés, or are only the accidental attendants of it in a few particular countries; and, where a similar connexion of fossils happens to come within our reach, we have it in our power to estimate fairly, the force of such arguments as have been derived from their nature and connexion in
any

any one country, by considering candidly, how far they should weigh with us in the instances which come immediately under our own particular observation *.

IN my former letters I enumerated the chief varieties of the basaltés and its attendant fossils, as they occur in the northern parts of Ireland; and I shall now, briefly state to you, such arguments as may be derived from them, in proof of the ancient existence of subterranean fire in their neighbourhood.

THE basaltés itself is esteemed to be nothing else than lava; and its varieties are entirely attributed

* To these gentlemen should be added, Mr. Deodat de Dolomieu, whose account of the Pontian Islands (Pontiæ Insulæ) on the coast of Italy; and still more, his discovery of the ranges of basaltic pillars, which are copiously dispersed around the coasts of Sicily; together with many judicious remarks on the eruptions of Mount Etna, and the nature of its lavas, merit the attention of the public, and afford considerable additional data to the mineralogist, whereby to reason concerning the formation of the basaltés itself.—See *Memoire sur Les Isles Ponces, &c. par Mr. le Commandeur Deodat de Dolomieu. Paris, 1788.*

attributed to accidental circumstances attending its course, the degree of fusion to which it has been subjected, or the manner of its cooling.

IN support of this bold opinion, (which maintains a similitude between substances, whose species have hitherto been held perfectly distinct,) it is affirmed, that the basalt agrees, almost accurately, with lava, in its *elementary principles*; in its *colour and grain*; in the diversities of its *texture*; in its *extraneous nature*, and the species of *foreign bodies* which it contains; and in almost all its *properties*, as well negative as positive.

THE following are the *elements* of which the basalt and lava are formed, and their relative proportions, according to the analysis of that able chymist Sir T. Bergman.

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100 parts of basalt of Staffa contain of 100 parts of lava contain of

	Parts.		Parts.
Siliceous earth - -	50	Siliceous earth - -	49
Argillaceous earth -	15	Argillaceous earth -	35
Calcareous earth -	8	Calcareous earth -	4
Magnesia - - -	2		
Iron - - -	25	Iron - - -	12
	<hr/> 100 <hr/>		<hr/> 100 <hr/>

HENCE it appears, that the *elementary parts* of the two species, bear an exceeding close affinity; and that the difference, even in the proportions of these principles, scarce vary more from each other than often happens, where separate specimens of either substance are compared between themselves*.

AMONG

* The proportions are probably various, even in different specimens of the same species of substance, so that slight differences of this sort in the constituent principles of the basalt and lava, are not to be esteemed of much consequence.

The

COAST OF ANTRIM. 11

AMONG the varieties of lava, instances occur where the *grain* is close and uniform, the *colour* dark, the substance hard, firm and sonorous, and where marks of vitrification are altogether wanting†. These are the general

The following table contains the analysis of the stone of the island of Staffa, and of the Giants Causeway, as given by Mr. Faujas de St. Fond in his *Essai sur les roches de trapp*.

Basaltes of Staffa 100 parts contain of				Basaltes of the Giants Causeway 100 parts contain of			
			<i>Parts.</i>				<i>Parts.</i>
Siliceous earth	-	-	40	Siliceous earth	-	-	46
Argillaceous earth	-	-	20	Argillaceous earth	-	-	16
Calcareous earth	-	-	12	Calcareous earth	-	-	10
Iron	-	-	21	Iron	-	-	22
Magnesia	-	-	5	Magnesia	-	-	3
Unaccounted for			2	Unaccounted for			3
			100				100

† Lave homogène, d'une couleur noire obscure : elle est très-dure & très-compacte ; son grain fin & très-serré n'a cependant aucune apparence vitreuse, il est plutôt terreux ; elle fait feu avec le Briquet ; elle agit fortement sur l'aiguille aimantée ; elle est susceptible d'un poli vif et brillant.—Tous ces caractères la font ressembler au “ Basaltes “ solidus, particulis subtilissimis.” Cette belle lave se trouve au-dessus de Piedmonte, dans les courants qui descendent des montagnes de Cirita.—See *Memoire sur les Isles Ponce*, par Mr. Deodat de Dolomieu, p. 185.

neral characteristics of the compact basalt, and seem to prove, that, casual circumstances may give to the one, the same general exterior appearance which prevails in the other.

ALTHOUGH the finer kinds of the basalt possess an uniform grain, yet, varieties of the species may be found, which assume a compound and heterogeneous character, in consequence of the admixture of different substances; among these, yellow crysolite, black opaque shorl, together with many minute and variously coloured crystallizations, may be observed. Similar phenomena are extremely frequent among the lavas of Etna and Vesuvius*; and though the manner of the production of these intruding substances be not clearly explained, yet the affinity between the basalt and lava, seems to derive strength even from this embarrassment, as the difficulty attends both species in common.

THE

* See Mr. Dolomieu's products of Etna. Mr. Ferber's account of Vesuvius, &c.

THE lava of modern volcanos varies from a close, compact and uniform *texture*, through all possible gradations, even to the sponginess of a cinder; and correspondent variations may with due attention be traced among the basaltcs, forming numerous additional features of resemblance between these fossils; with this further circumstance of similitude, that each substance becomes compact toward its central parts, although frequently cellular at its surface.

THE basaltcs possesscs in a remarkable degree, the *property* of being *fusible per se**. This property is also common to the lava, and to most volcanic substances.

The basaltcs is a *foreign substance* superinduced on the original limestone soil of the country, in a state of fineness capable of allowing

* Besides this easy fusibility, it acts powerfully when in fusion, as a flux for other substances; the best crucibles which I could procure, were generally melted by it, wherever the heat was intense.

lowing the *flints*, and other stones, to penetrate within its lower surface.—It is hardly necessary to add, that the lava is an extraneous mass, overspreading the soil in a fluid state; that it is often borne on a limestone base; and that flints and other hard fossils do frequently penetrate into its substance*.

EVEN in their *negative characters*, so strong a degree of similarity appears, as is supposed to mark them of a common family.—The *basaltes* does *not* effervesce in any of the mineral

* “ On whatever side you set out from Naples, travelling to the end of this volcanic covering, you meet with calcareous tuf-stone or limestone hills, which are the branches of the Apennines. Behind Monte Somma and Vesuvius, towards Sarno and Nola, the ground consists in calcareous incrustations, washed down from the Apennines; which calcareous hills coming from Terracina run round the city of Naples and Vesuvius, and appear on the other side of Pompeia. Even in the sea, beyond this volcanic covering, there rise large calcareous rocks or islands, such as Capri. Hence it is probable that the limestone is running under ground of the volcanic ashes and lavas, and the more so as large *white limestones* are thrown out of Vesuvius.” See *Translation of Mr. Ferber’s Letters*, p. 124, London.

ral acids; neither do the correspondent varieties of lava. The basalt does *not* contain the slightest traces of animal or vegetable exuviae; and the very nature of the lava precludes all vestiges of any species of organised matter in its substance.—In short, the circumstances of agreement are so numerous, and so clear, as to create a very reasonable presumption, that they are one and the same species of fossil.

To these particular arguments, derived from the similitude which exists between the elementary principles, and obvious properties of the two substances, another plausible one may be added, from the general consideration of those fossils, that are usually supposed to be the food, and materials, from whence all volcanic eruptions originate.

It is well ascertained by experience, that there are vast beds of pyrites dispersed through the interior parts of the earth; and it is certain, that this compound substance may, by
the

the accidental affusion of a due quantity of water, become hot, and at length burn with great fury. This therefore is one principle, to which we may, with the strongest probability, attribute the origin of subterranean fire; more especially, as the present living volcanos do actually pour forth in abundance, all the component parts of the pyrites; the chief of which are sulphur, iron, and clay. Now, among the superinduced substances of the county of Antrim, (and I believe the same may be said of every other basaltic country) it is certain, that the quantity of iron and clay, diffused through almost every species of fossil, amounts to a very large proportion of the whole materials; so that two of the principal elements of the pyrites are still found here, reduced in many instances to a state, not very dissimilar from the appearance of slag or scoria: and the third principle, namely the sulphur, cannot in the nature of things be expected to remain, because sulphur does in great measure perish during the act of inflammation; and what
might

might perchance escape, or be sublimed, would no doubt have long since perished by decomposition, in consequence of being exposed to the air.

THUS in fact, every part of the pyrites which could reasonably be expected to survive, does at this day actually exist, in form extremely similar to the products of *Ætna*, *Vesuvius*, and *Hecla*, the three most celebrated volcanos of Europe.

BUT the evidence derived from the nature and properties of the *attendant fossils*, seems also to contribute largely in support of this opinion.

IN my last letter I detailed the process, whereby a substance is frequently produced in our basaltic precipices, resembling, in its nature and properties, the *terra pozzolana* of Italy and other volcanic countries; it is a powder sharp and gritty to the touch, possessing

selling the same elementary principles as the *pozzolana*, and answering for its valuable purposes as a cement*. The pouzzolane earth is found in the Canary Islands, which are esteemed to have unequivocal characteristics of the effects of fire; it is to be seen in abundance through all the volcanized parts of Italy; it is never discovered except in places which have other strong marks of the ravages of fire. The discovery of this earth is, therefore, thought to add weight to the other proofs that have been mentioned, in favour of the general system.

THOSE extensive beds of *red ochre* which abound amongst our basaltcs, are supposed to result

* From some hasty experiments made on this substance, I am induced to think it worth the attention of the gentlemen concerned in carrying on the inland navigation of Ireland; and there is the more reason for hope of success in the enquiry, as the Swedes have already applied their pulverised trapp, (much resembling our coarse basaltcs) as a good substitute for the Pozzolana, formerly brought, at a great expence, from Italy and the Canary Islands.

result from an iron earth, reduced to this state of a calx, by the long continued and powerful action of heat; for such a change may be produced on iron in our common furnaces, provided there be a sufficient afflux of fresh air; and the basalt itself, in such circumstances, is easily reduceable to an impure ochre, exactly similar to that found in the semicircular bays of Bengore. This phenomenon is also observed to take place, in the present living volcanos, particularly within their craters; and is therefore held to afford a presumptive argument of the long continued action of fire, in the neighbourhood of the basalt, and particularly, in these precipitous and semicircular bays themselves.

I REMARKED to you, the frequent crystallizations of *zeolyte*, which abound through the cellular basalt of the county of Antrim; and these, though not the immediate product (as far as I know) of any living volcano, are yet thought to countenance the general system; because *zeolyte* is found in other

R

countries

countries where subterranean fire is still visible, and where there is great reason to apprehend, that the whole soil has been ravaged by that principle. Thus, it abounds in Iceland, where the fires of Hecla continue to burn*; in the island of Sicily, so long celebrated for its Etnean flames†; and in the isle of Bourbon, which is said to bear undeniable marks of a volcanic character‡. Hence this substance is supposed to arise from the decomposition of the volcanic products, at a period long subsequent to their original formation.

THE term *basaltic cinder* carries with it a supposition of the operation of fire; it is therefore only necessary to remind you, that a substance is found in the county of Antrim, to which this name may properly be applied; indeed, it bears the character of a cinder, so obviously, in its exterior appearance, that
one

* See Dr. Troil's Letters on Iceland.

† See Mr. Dolomieu's Products of Etna.

‡ See Messrs. Desmarest, Faujas de St. Fond, Raspe, &c.

one must be convinced, at first view, of its original. This fossil is sometimes found on the shore of the island of Raghery, among the rounded stones on the beach of the sea; and being supposed an unequivocal test of the action of fire, is imagined to compleat all that could be desired in this kind of reasoning*.

SUCH are the *internal arguments* in support of the volcanic origin of the basalt, immediately derived from the nature and properties of that substance, and its attendant fossils, compared with other substances which are the certain products of fire; and it must be confessed, that there appears throughout, such a remarkable coincidence of circumstances, as raises a strong presumption in favour of the

R 2 opinion,

* This fossil occurs so rarely, that I have often been induced to doubt whether it might not be a foreign substance, casually driven hither by the waves, from Iceland, or some other volcanic country. However, on trial, it is found too heavy to have floated hither, its iron not being entirely dephlogisticated, as is evident from its deep black colour, and a small degree of magnetism which it still possesses.

opinion, that they have been produced by similar causes. But there still remain other *external proofs*, which, when added to the former, are supposed to form a demonstration almost as perfect as the nature of such analogical reasoning will allow.

IN the beginning of this letter I mentioned that Messrs. Desmarest and Faujas de St. Fond had described the basaltic provinces of France, as containing mountains, whose exterior appearance was such, that they readily pronounced them to be extinct volcanos. One of these, on the banks of the river Ardesche, called the Montagne de la Coupe, seems to exhibit the proofs of its origin in characters peculiarly clear and distinct. It is of a conical form, exactly corresponding in shape with the present living volcanic mountains, and like them, it contains a large crater, nine hundred and fifty feet in diameter, and six hundred feet in depth*. The substances that have been

* See Mr. Faujas de St. Fond's Work—*Sur les eteints Volcans*, &c.

been discovered through all its parts, particularly in a deep ravine formed on one side by torrents, bear a strong resemblance to many of the Vesuvian products. In fine, the volcanic features of this mountain are so strongly marked, that an accurate account of it, would afford no very unsuitable description of Vesuvius itself, during the intervals of its eruptions. Now, the Montagne de la Coupe is formed of fossil substances precisely similar to those of our northern counties, and seems to rest on a base of basaltic pillars, which have been exposed to view, on one side, by the impetuous torrents of this mountainous country, particularly of the river Ardesche, whose banks are formed of columnar basaltes. Thus are the two characters of a basaltic, and ancient volcanic mountain, esteemed to be decisively united in the Montagne de la Coupe*.

THERE

* I have been the more particular in mentioning this mountain, because my information concerning it has been corrected, and confirmed, by the account of my intelligent friend

THERE are three living volcanos, at present known, within whose neighbourhood the basaltés, and most species of its usual attendant fossils, have been observed. The first is situated in the island of Bourbon, off the southern coast of Africa*; the second is *Ætna*, in the island of Sicily†; and the third is *Hecla*, in the island of Iceland‡. To which it may be added, that the basaltés is found in the volcanized parts of Italy, as at *Bolzena*§, and

friend Doctor Perceval of Dublin, whose accurate observations, and excellent judgment, can only be exceeded by the uncommon candour of his mind.

* See Messrs. Desmarest, Faujas de St. Fond, Raspe, &c.

† The entire base of the vast volcanic mountain of *Etna* seems to be formed of basaltés. “*Les Laves anciennes de l'Etna, prenoient frequemment cette forme: on trouve des colonnes de basaltés dans tout son contour; elles lui font une espece de ceinture circulaire, a une hauteur de deux ou trois cents toises au dessus de la surface de la mer.*” See *Mr. Deodat de Dolomieu's account of Etna*, p. 45¹.

‡ See Doctor Troil's Letters on Iceland.

§ See Sir William Hamilton's *Campi Phlegrei*, Ferber's Letters, &c.

and other places; though not (as far as I have been informed) any where immediately contiguous to Vesuvius. Thus, (say the naturalists) do the arguments derived from the situation of this species of fossil, with respect to mountains which yet continue to burn, coincide with those other clear and satisfactory proofs, which were drawn immediately from its nature and properties, in proof of its volcanic origin.

BEFORE I close my letter on this interesting subject, allow me to trespass a little longer on your time; and to mention a few circumstances, relating to the changes, which the *more original fossils* of these northern counties of Ireland have undergone, in consequence of the approach and contact of the basalt; because, should the phenomena attending these alterations, chance to correspond with others, which we know to be the effects of fire, in situations that come clearly within our own observation, a very strong presumption will arise, that they owe their existence to a similar cause

cause in those other doubtful instances, where they are discovered in the vicinity of the basaltcs.

I HAVE oftentimes directed your attention to the original calcareous stratum of this country, and to the nodules of flint which it contains. This substance, although generally speaking, it is very much deranged, and sometimes totally displaced, yet, in many instances, has maintained itself, at various degrees of elevation, beneath prodigious masses of the irregular basaltcs; and in some of the sharpest precipices, affords opportunities, for a very distinct examination of the effects that have attended its union with the incumbent beds*.

BETWEEN the basaltcs and the limestone an heterogeneous stratum generally intervenes,
doubtfully

* The mountain of Lenbredagh, and the precipice called Solomon's Porch, in the county of Londonderry; and numberless places along the coast of Antrim, from Portrush to Belfast, afford easy opportunities for this examination.

doubtfully belonging to either substance, but partaking of the nature and properties of each; its basaltic tendency encreasing toward the upper surface, whilst the flinty and calcareous earth become predominant as one descends. It is extremely friable, and from this circumstance, a minute examination of it requires caution, where the situation may perchance be elevated as well as abrupt. This loose and perishable texture, seems chiefly to have resulted from a redundance of the inferior matters, and particularly, of the powder and fragments of the flints wherewith it plentifully abounds; an easy separability, and incoherence of parts, usually prevailing in every substance, where the siliceous earth predominates under similar circumstances.

BESIDES the admixture of siliceous powder, and shivered fragments of flint, this intermediate stratum contains many of the nodules themselves, loosely and tumultuously tumbled together. As these were originally situated at pretty regular intervals, amid the
calcareous

calcareous stratum, their number and contiguity seems to mark, that they are the accumulated quantity, which has arisen from a large portion of the limestone, that has either perished, or been materially altered, in the neighbourhood of the basalt.

THESE flints are usually shivery in their texture, easily broken and reduceable to powder, of an opaque and muddy whiteness; and, in numberless instances, exhibit appearances well known to attend the imperfect calcination of flints by fire. Oftentimes they have incorporated, from the basalt, a calx of iron, which has tinged them with many varieties of a red colour.

FROM an attentive observation of these, and many other circumstances, attendant on the contact of the basalt with the subjacent limestone, the phenomena appear to carry with them characters, extremely similar to those that are the known effects of a long continued, but not intense heat; whereby the calcareous
beds

beds have been partially reduced to lime, and incorporated with the superior substances; the flints imperfectly calcined, frequently reduced to fragments, detached from their original matrix, and copiously dispersed through this new and heterogeneous mass: Whilst the iron of the basaltes, suffering a considerable dephlogistication at the lower surface, the incumbent bed has in many instances, produced varieties of an ochre, whose different tints and colours have been communicated to the flints themselves, during the long succession of ages which have passed, since their first dispersion through the midst of that substance.

ALL these phænomena correspond, so accurately, with the acknowledged effects of fire; are so easily explicable, by the agency of that potent principle, and so difficult to be accounted for upon any other hypothesis, that, the mind, naturally averse from a state of uncertainty, endeavours to be satisfied with an opinion, so facile in its application to every difficulty,

difficulty, and apparently so well founded in its nature.

IN a short account of the Ballycastle collieries, which you formerly received from me, I made mention of the extraordinary partitions of basalt, which, like walls of iron, intersect the strata attendant on the coal of that place, and divide in twain the solid precipice, from its summit to its base*. In that letter, I remember to have suggested a theory concerning the formation of these partitions, which must then have appeared to you as the amusing sport of fancy, rather than the work of sober reason, minutely attentive to the toil of actual observation. There are nevertheless, some circumstances connected with these septa, which merit attention, and seem to throw an air of plausibility on that fanciful opinion.

As

* See Letter III. Part I. of this work. These septa occur in other places as well as at Ballycastle, though less distinctly visible. In some of the Hebrides, where they are found under similar circumstances, they are called *whin-dykes*, as being formed of whinstone or basalt.

As all the strata of the Ballycastle precipice are indiscriminately divided by the partitions of basalt, that substance has, of course, come into the vicinity of the beds of fossil coal; and this too, in a perpendicular situation, where foreign unflammable substances could scarcely intervene, in any considerable quantity, between the basalt and the coal itself. —Here then, it may naturally be expected, that phenomena should occur, adapted to throw considerable light on the general question. Of these I shall mention a few, which apparently are of the most importance, and then close this long letter.

WHERE the wall of basalt is visible near the sea, it is superficially black and cellular, of an exceeding hard texture, and extremely similar to the exterior character of spongy lava. Within the precipice, in the vicinity of the coal, it is comparatively soft, of a blueish colour, and an argillaceous appearance, seemingly in a state of decomposition. The coal is generally separated from it by a thin coating of
blue

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blue clay, probably formed from the basalt itself; but this is so very scanty, in some instances, as hardly to deserve notice, so that with due attention, the absolute contact of these substances may be discovered.

IN this situation the coal, as I once before mentioned*, is so much cracked and shattered, as scarce to bear the touch, and the divisions which seem to cause this easy separability, are perpendicular to the contiguous surface of the basalt. It has the glazed appearance and leaden colour of charred-coal, but hardly any of its sponginess. It does not blaze in the hottest fire, but like charred-coal, forms a clear and bright cinder, without flame, or smoke, or the least visible vapour. It exhibits appearances of pyrites in some places, and from its weight, and other circumstances, seems to contain a considerable proportion of iron, which it has probably derived from the basalt. It is denominated *burnt coal* by the
the

* See note in page 54, part I. of these Letters.

the smiths and miners of the place, from the coincidence of its properties and appearance with those of forge cinders; and was at first view, pronounced by the workmen attending a considerable coak-oven in Dublin, to be a coal badly charred, and too much smothered in the process.

THE *natural coal* of these beds is divisible into laminæ, but yet is close in its grain, and firm in its texture; it contains an exceeding small portion of iron; is black and jetty in its appearance; and burns with a vivid, brisk, and plentiful flame; the nitrous acid attacks it with rapidity, and in a short space becomes tinged of a red colour, the phænomena always attendant on its union with oily and bituminous substances. In fine, the *general* properties of the Ballycastle coal, are so substantially dissimilar from those *singular* qualities, that occur in the vicinity of the basalt, as seem unequivocally to mark the operation of some potent principle, capable of producing a decided alteration in its nature; whilst on the
other

other hand, the similitude which these effects bear to the correspondent changes, that are known to take place in the artificial formation of charred-coal, renders it extremely probable that they have been produced by one and the same active element of fire, operating with those slight differences and varieties, which might be expected to result from local and purely casual circumstances*.

SUCH

* The encrease of weight in the Ballycastle *burnt coal* depends on a redundancy of iron derived from the basalt; and its want of sponginess may have arisen from the excess of pressure not permitting that dilatation of the parts, which takes place in the common inflammation of pit coal.

Some chymical experiments made on equal portions of *common Ballycastle coal*, on *charred-coal*, and on this *gaw* or *burnt coal*, should be mentioned here, but that the detail might be tedious, and perhaps foreign from a work which endeavours to be restrained within the limits of pure mineralogy. It will only be necessary to say, that a remarkable coincidence takes place between the chymical phenomena attending the charred and *gaw* coal, in every instance, except such as depend on the redundancy of iron in the latter; and that the dissimilitude is equally remarkable, between these and the effects produced with the common coal of Ballycastle.

SUCH are the evidences in favour of this bold and daring theory, which maintains the ancient existence of subterranean fire in our temperate climate, and even over a large portion of our entire northern hemisphere; for it is certain, that whatever be the reasonings that fairly apply to the formation of the basaltic in our island, the same must be extended, with little interruption, over the main land and western isles of Scotland, even to the frozen island of Iceland, where basaltic pillars are to be found in abundance, and where the flames of Hecla still continue to blaze.

COAST OF TEXAS

THE GULF OF MEXICO

THE BAY OF CALIFORNIA

THE PACIFIC OCEAN

THE NORTH PACIFIC

THE NORTH ATLANTIC

THE SOUTH ATLANTIC

THE SOUTH PACIFIC

THE INDIAN OCEAN

THE ARABIAN SEA

THE BAY OF BENGAL

THE GULF OF ADEN

THE RED SEA

THE MEDITERRANEAN

THE BLACK SEA

THE CASPIAN SEA

THE ARCTIC OCEAN

THE NORTH ATLANTIC

THE SOUTH ATLANTIC

THE PACIFIC OCEAN

THE INDIAN OCEAN

THE ARABIAN SEA

THE BAY OF BENGAL

THE GULF OF ADEN

THE RED SEA

THE MEDITERRANEAN

THE BLACK SEA

THE CASPIAN SEA

L E T T E R VII.

DEAR SIR,

NOTWITHSTANDING the numerous, and specious arguments, which are urged in defence of the volcanic theory of the basalt, yet, many difficulties and objections have been raised against it, by men of excellent understanding. Some of these are of considerable force; and as I do not wish to dictate any opinion to you, but rather, modestly to offer what information has occurred to me on the subject, I shall candidly state

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those

those objections, together with the most reasonable answers.

It is said, that this theory rashly attributes some of the most regular and beautiful phenomena of nature, to one of the most tumultuary and irregular causes that can be imagined; ascribing the exquisite arrangement of a Giants Causeway, which emulates the laboured works of design, to the blind fury of a burning volcano.

THIS objection, which is pretty strong in itself, has certainly received very considerable support, from the various unsuccessful attempts that have been made, to explain the manner in which the pillars of basalt were produced: One person * wildly attributing their
formation

* Mr. Raspe. To Mr. Raspe may be added Mr. Dolomieu and others.

The opinion maintained by these gentlemen, though contrary to every species of experiment and analogy, seems to be more generally adopted than any other. It is founded entirely on the observation of pillars of basalt situated in the sea, which of course arrest and engage the attention,

formation to the refrigeration of a current of lava, suddenly plunged into the ocean ; an opinion directly contrary to every analogy in nature. Another † obscurely hinting, that
some

in consequence of being cleared and washed by the waves from all heterogeneous and irregular covering. But the circumstance of their submarine situation appears to be altogether casual ; for they occur in abundance, at the height of a thousand feet above the surface of the ocean, and at considerable depths beneath its *bottom*.

From such analogies as are most to be relied on, it is extremely probable that the columnar basalt is more perfect, in proportion as its situation is more depressed ; and that its compactness and regularity decrease in ascending, and vanish altogether at very considerable elevations.—Conformable to this opinion, we may infer from the authority of Mr. Dolomieu himself, that the primitive lavas of volcanic mountains which were erupted in low situations, (or perchance subsided altogether without an eruption,) are in their nature uniform, compact, of a columnar tendency, and extremely near to the character of genuine basalt : but that the more modern lavas, sustaining an intense heat ; agitated by the expansion of elastic vapours, and by their powerful influence raised from vast depths, antecedent to their eruptions, exhibit a vitrified appearance, are universally spongy and unformed, and bear but a very faint resemblance to the compact basalt.

† Mr. de Luc.

some occult quality in the sea salt might have had its share in the business: A third * supposing, contrary to experience, that the melted mass of lava might, in its liquid state, have been capable of a considerable diffusion or solution in water, by which means the particles had an opportunity of arranging themselves in regular crystallizations: A fourth †, conceiving, that the basalt was originally a bed of iron, and other substances, gradually moistened, and softened in the steams of water heated by subterranean fire, which had afterward assumed its regular figure during the time of drying and hardening.

It is pretty plain, that none of these indefinite explanations can at all satisfy a thinking mind; and as an unfortunate argument generally tends to encrease the apparent weakness of a cause, in defence of which it is brought forward, it has hence come to pass, that

* Mr. Kirwan.

† Sir T. Bergman.

that many persons of good sense, have held the whole volcanic system to be extremely fallacious.

IN truth, there seems to be but one operation of nature, which affords any rational principle of analogy, by which we can attempt to explain the formation of the basaltic pillars. It is certain that the particles of most bodies, when removed from each other to a proper distance, and suffered to approach gradually, assume a peculiar form of arrangement, as if the parts of each species of matter, independent of their general properties of cohesion and gravity, possessed also private laws and affinities, tending to produce these specific forms. However, let the cause be what it may, the fact at least is sufficiently certain: and it does not appear to be a matter of any importance by what medium the particles are disunited, provided only, that a sufficient separation, and a gradual approximation, be allowed to take place.

THUS,

THUS, whether bodies be dissolved by the principle of fire, or by a watery medium, the phænomena of crystallization is equally observable, when proper art has been applied to render its effects visible.

I MENTIONED, in a former letter, that the basalt was capable of a very perfect fusion; and that two of its elementary parts were such as, by experience, we know to possess the property of crystallization by fusion, both in their separate and combined states*. Since therefore the basalt, and its attendant fossils, bear strong marks of the effects of fire, it does not seem unlikely that its pillars may have been formed by a process, exactly analogous to what is commonly denominated crystallization by fusion.

THE only apparent specific difference between the basaltic crystals, and those which are produced in our diminutive laboratories,
seems

* See letter III. page 50, of this part.

seems to be, in the complete disunion of the pillars, and in the articulated form which they oftentimes exhibit. But this will not appear to be a matter of any importance, when we reflect, that in natural operations of the same kind, but differing in magnitude, the same proportions are commonly observed between the different parts: Thus, the same ratio which the diameter of a basaltic pillar bears to the diameter of one of our diminutive crystallizations, will the interval between the pillars of basaltes bear, to the interval between the parts of our crystals; and whoever will take the trouble to calculate this distance, will find it so very small, as easily to admit the different surfaces within the limits of cohesion; so that no separability of our crystals into joints can possibly take place, from their smallness, though they often bear marks which might lead one to imagine them capable of disunion.

If this reasoning be allowed to have weight, the objection derived from the irregularity
and

and confusion of a volcanic cause will not appear unanswerable. For though, during the moments of an eruption, nothing but a wasteful scene of tumult and disorder be presented to our view, yet, when the fury of those flames and vapours, which have been struggling for a passage, has abated, every thing then returns to its original state of rest; and those various melted substances, which, but just before, were in the wildest state of chaos, will now subside, and cool with a degree of regularity, utterly unattainable in our laboratories, and such as may easily be conceived capable of producing all the beauty and symmetry of a Giants Causeway.

A SECOND objection arises from hence, that the currents of lava which have issued from *Ætna* and *Vesuvius*, within the memory of man, have never been known to exhibit this regularity of arrangement. It is therefore affirmed, that experience abundantly proves the fallacy of the volcanic hypothesis.

IN reply to this it is said, that the lava of modern volcanos, previous to its eruption,

is subjected to a most violent and intense action of heat, sufficient to dephlogisticate and vitrify many of its parts, and thus to render them altogether unfit for the process of crystallization; that a degree of ferment and agitation, almost inconceivable, is necessary to raise and swell this melted mass from the deep abyss wherein it is prepared, far beneath the level of the sea, to those elevated situations from whence it often pours like a torrent over the adjoining country; and that during this operation, the expansive efforts of those various inflammable and elastic vapours, (which alone seem equal to the accomplishment of such a prodigious effect,) must so agitate and separate its parts, must produce such innumerable vacuities and air-holes, as will totally counteract the peculiar laws of attraction, those nice and delicate affinities, upon which the production of regular forms seems entirely to depend*.

HENCE

* From these violent and tumultuary operations it comes to pass, that the *compact lava* of modern volcanic mountains,

HENCE we are told, that it is not in the erupted torrents of modern volcanos we are to look for the phænomena of crystallization; but in the interior parts of the mountains themselves, at their lowest base, and even beneath the surface of the earth; where the metallic particles of the lava have not been dephlogisticated by the access of fresh air, and where perfect rest, and the most gradual diminution of temperature, have permitted the parts of the melted mass to exert their proper laws of arrangement, so as to assume the form of columnar lava: That we must wait, until those volcanic mountains,

tains, does not amount to the thousandth part of all the substances that are discharged from them: ashes, cinders, pumice stone, scorix, cellular lava, and similar productions, form by far the larger portion of these mountains; whilst the compact lavas are chiefly to be found at their base, where they have been produced, and erupted without violence or tumult, and cooled with that gradual slowness which always accompanies the refrigeration of vast masses of quiescent matter, "A l'Etna, par exemple, les laves compactes ne sont peut-être pas la millieme partie de la masse de cette vaste montagne; on peut les regarder comme une charpente qui soutient un volume énorme de laves cellulaires, et de scories." *M. Delomieu sur les Isles Ponces, p. 173.*

mountains, which at present burn with so much fury, shall have compleated the period of their existence; until the immense vaults, that now lie within their bowels, no longer able to support the incumbent weight, shall fall in, and disclose to view the wonders of the subterranean world: And then may we expect to behold all the varieties of crystallization, such as must needs take place in these vast laboratories of nature; then may we hope to see banks and causeways of basalt, and all the bold, and uncommon beauties, which the abrupt promontories of Antrim now exhibit.

OF such phænomena as these, we have even some anticipation, in the present living volcanos. —Like the ancient Montagne de la Coupe, *Ætna* rests on a columnar base, exposed to view on that side, where the sea has rendered visible the interior structure of the coast of Sicily *; and even from *Vesuvius* itself, basaltic joints
are

* Les laves anciennes de l'*Ætna* prenoient fréquemment cette forme: on trouve des colonnes de basalt dans tout son

are reported to have been thrown forth, during the time of an eruption *. These are circumstances sufficient to demonstrate, that the want of columnar forms in the modern lava, arises entirely from extraneous, and purely casual circumstances, and is not to be esteemed of any weight in depressing the volcanic theory of the basaltés.

It is stated as a third objection, that, according to this hypothesis, the basaltés must have been reduced to a perfect state of fluidity, in order to permit the phenomena of crystallization to take place; but, that there is no reason for believing, it ever could have been subjected to any intense action of fire, so as to be reduced to a state of thin fusion, because it does not contain air-holes, like the lava, nor possess those marks of vitrification,

son contour; elles lui font une espèce de ceinture circulaire, à une hauteur de deux ou trois cents toises au dessus de la surface de la mer.—*Memoire sur les Iles Ponces*, page 45¹.

* See Sir William Hamilton's account of Vesuvius.

cation, which attend a very moderate heat in our laboratories.

THE first part of this objection is certainly ill-founded, though advanced by Wallerius, and other eminent mineralogists. All the basaltés, which I have ever seen, does, in one part or another of its substance, exhibit air-holes; and it is remarkable, that even the pillars of our Giants Causeway, which are singularly compact, have their upper joints constantly more or less excavated, so that this part of the argument rather pleads in defence of the volcanic origin of the basaltés.

WITH respect to the want of all marks of vitrification, we are to consider, that substances in fusion are very differently affected, in proportion as they are more or less exposed to the access of fresh air; the presence of this element being absolutely necessary in order to deprive a body of its phlogiston.

Thus,

Thus, metals which may be readily vitrified by exposure to heat, and the free afflux of air, will yet bear the most intense action of fire in close vessels, without being deprived of that principle on which their metalliety depends, and are therefore in this situation incapable of being vitrified. The basaltcs may therefore have been subjected to a very great degree of heat, within the bowels of the earth, and yet shew no marks whatever of vitrification; and hence may be explained, how it comes to pass, that the iron principle of the basaltcs still retains its phlogiston, acting so sensibly on the magnetical needle.

A FOURTH objection is derived from hence, that in many of the countries where the basaltcs most abounds, there are no traces whatever of those bold and decisive features which constitute the distinguishing characteristic of a volcanic mountain; its lofty pointed form, its unfathomable crater, and many other circumstances that strike the senses
very

very forcibly at *Ætna* and *Vesuvius*.——
 The basalt, therefore, is affirmed to be a fossil extensively spread over the surface of the earth, entirely independent of any operation of fire; and where it is found in the neighbourhood of volcanic mountains, it is said we should suppose these to be accidentally raised on a basaltic soil, rather than to have created it.

It must be confessed, that, volcanic mountains are not always found to attend the basalt; at least, there do not appear any direct vestiges of them in the neighbourhood of the Giants Causeway in Ireland.

BUT the advocates of the system are not much embarrassed with this difficulty; according to them, the basalt has been formed under the earth itself, and within the bowels of those very mountains, where it could never have been exposed to view, until by length of time, or some violent shock of nature, the incumbent mass must have undergone a very considerable alteration, such as should

go near to destroy every exterior volcanic feature. In support of this it may be observed, that the promontories of Antrim do yet bear very evident marks of some violent convulsion, which has left them standing in their present abrupt situation; and that the island of Raghery, and some of the western isles of Scotland, do really appear like the surviving fragments of a country, great part of which might have been buried in the ocean. It is further added, that though the exterior volcanic character be in a great measure lost in the basaltic countries, yet this negative evidence can be of little avail, since the few instances where the features have been preserved afford, a sufficient answer to this objection.

THUS the Montagne de la Coupe in France, still rears its pointed top to the Heavens, retains its deep crater, and bears every characteristic of its volcanic origin; and this mountain is observed to stand on a base of basaltic pillars, not disposed in the tumultuary
heap,

heap, into which they must have been thrown by the furious action of a volcanic eruption, tearing up the natural soil of the country; but arranged in all the regularity of a Giants Causeway, such as might be supposed to result from the crystallization of a bed of melted lava, where rest, and a gradual refrigeration, contributed to render the phenomenon as perfect as possible.

THUS again, the vast volcanic mountain of Etna, whose summit is elevated near eleven thousand feet above the sea, and whose base covers a large portion of the entire island of Sicily; that enormous pile, the accumulated mass of all the substances which have there issued forth from the bowels of the earth, through a long succession of ages, seems to be entirely formed of basaltic to the height of a thousand feet, or more, above the present level of the sea. As one ascends this mountain, the effects of an intense heat, and of violent internal struggles, are manifested by huge detached rocks, heaps of scorice, and torrents of spongy lava;

but in descending, every thing seems to mark the operation of less tumultuary causes: the vitrified and cellular substances decrease in quantity; the lava becomes uniform and compact; and, finally, the basalt appears toward its base, assuming a columnar tendency, in every instance, where the lowness of its situation, and the vastness of its mass, must have prevented a dephlogistication, and ensured perfect tranquillity, and the most gradual refrigeration of its internal parts*.

FIFTHLY. It is observed by Mr. Faujas de St. Fond, that at the foot of the mountain of Mezinc, in the province of Velay, a range of basaltic pillars stands supported on a bed of fossil coal, with a very thin stratum of clay, not more than a few inches thick, interposed; now, that this inflammable body of coal should have remained uninflamed, beneath a mass of melted lava, thirty feet thick, seems

* See *Essai sur les Iles Ponces, et les Produits de l'Etna*, by Mr. Deodat de Dolomieu.

seems highly improbable; therefore it is evident, say the adversaries of the system, that the basaltic could not have derived its origin from fire.

IN answer to this plain and weighty objection, it is asserted, that no substance in nature can be consumed by fire, without the access of atmospheric air; that fire may be passed through inflammable air itself, without exciting actual inflammation, unless the atmosphere shall lend its assistance. Hence it cannot appear strange, that a bed of coal might have survived in the neighbourhood of a volcano, and even under a mass of fluid lava, which, by resting on it, would prevent every possible approach of fresh air, so absolutely necessary to its being inflamed. It is certain, that coal may be exposed to the violent action of fire, in a close vessel, without being consumed, or even suffering any material alteration, and therefore it is believed that this particular instance ought not to be held of weight sufficient to overturn a system, in support

port of which so many reasonable and almost certain proofs concur.

BUT the evidence derived from the alterations that have been produced in the Ballycastle coal, in consequence of its vicinity to the basalt, seem effectually to diminish the weight of this objection; because these changes appear to bear an unequivocal resemblance to many of the effects, usually known to result from the action of fire in peculiar situations; and thus afford a *positive* example of the interference of that potent element, which, if esteemed to be sufficiently clear in its kind, must be deemed more than a counterpoise, to any *negative* instance whatsoever, that is not attended with circumstances most uncommonly decisive and unambiguous in their nature.

SUCH are the difficulties which are thought to embarrass the volcanic theory of the basalt. In your excellent judgment I am certain they will bear their just value, founded
on

on an extensive knowledge of nature and her operations. But among the generality of mankind their weight will be exceedingly various. In reasonings concerning natural phænomena, the standard of truth is extremely vague and equivocal. Climate bears here a more powerful influence than can well be imagined; so that it is not uncommon to find an opinion, generally adopted by the inhabitants of one country, while those of the neighbouring kingdom shall join as universally to reprobate it.

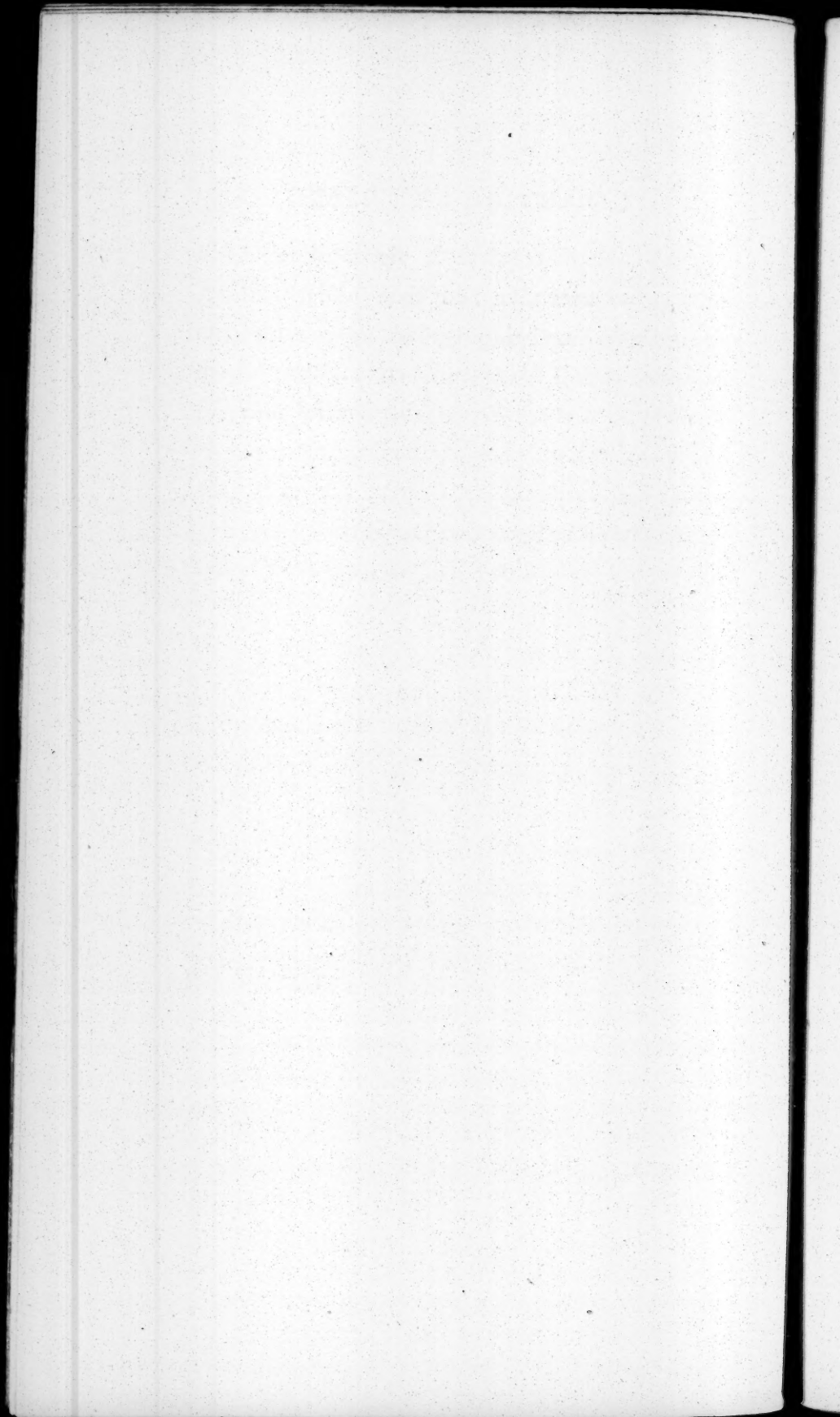
THUS the Neopolitans, accustomed from their infancy, to the wild scenes of horror and desolation which abound in a soil ravaged by volcanic fire, and to see as it were a new world suddenly raised on the ruins of their country, have their warm imaginations filled with the gigantic idea of this powerful principle, which to them, appears adequate to the production of every thing that is great and stupendous in nature. How different are the sensations and opinions which prevail in
the

the native of our temperate island! To him the sound of thunder is uncommon, an earthquake is almost a prodigy, and the fury of subterranean fire is utterly unknown. He beholds nature pursuing her calm and steady course, with an uniformity almost uninterrupted; he views the same objects unchanged for a long series of years; the same rivers water his grounds, the same mountains supply food for his flocks, the same varied line of coast continues, through many successive ages, to bound his country, and to set the waves of the foaming ocean at defiance: hence he naturally proceeds to extend his ideas of regularity and stability over the whole world, and stands, utterly uninfluenced by those arguments of change in the earth, which to the inhabitant of a warmer climate appear absolutely decisive.

IN this manner are the prevailing opinions, even among the philosophers of most countries, generally founded on partial analogies;

logies ; and it requires a vigorous mind, as well as an extensive and clear understanding, to prevent our being misled by the specious arguments and dangerous conclusions, which have been derived from such deceitful sources ; many of them plainly tending to multiply false opinions, and to subvert the only true principles of religion and morality.

LETTER



LETTER VIII.

DEAR SIR,

IF the volcanic theory of the basaltēs be well founded, and no doubt many of the arguments in favour of it are extremely plausible, a scene of horror is presented to our view, which must surely fill us with astonishment; since on this system, it will be found, that there is hardly a country on the face of our globe, which has not, at some time or other, been wasted by the fury of subterranean fire.

IF again, those apparent vestiges of marine productions, which are observed indiscriminately

nately scattered through the earth, at all depths below its surface, and on the summits of its highest mountains, be esteemed sufficient proofs of the presence of the ocean in these places, a scene, no less wild and uncommon than the former, rises before our imagination; in which the products of the equator and the poles appear to be jumbled together, in a manner incapable of being explained by any of the known analogies of nature.

FROM observations such as these, where in truth every thing is inexplicable, many of the modern philosophers, chiefly indeed of the French nation, have become warm admirers of the old brute atoms of Epicurus, or the mysterious plastic principle of the Stoics; forming to themselves systems of nature, in which an intelligent principle seems to be of all causes the least necessary; systems wherein blind destiny alone is the active spring of life and motion.

THUS

THUS are the sources of religion and morality effectually cut off at one blow; and mankind deprived of those present blessings, and that delightful hope of future happiness, which they fondly imagined to be rightly founded on their natural instincts, and supported by the fairest deductions of reason.

It is the business of natural history to collect, as extensively as possible, all the phenomena of nature; to compare such of them as bear any reasonable similitude; and from their general analogies, to derive conclusions which may benefit our fellow-creatures, either as discoveries useful in common life, or as speculative truths suited to improve and enlarge the understanding. In this point of view, it is a science which merits the honourable praise of mankind; and is certainly inferior to none, in the copious sources of delight and improvement which it may afford to a rational mind.

SURELY

SURELY it is most unaccountable, that a study which, in this character, appears so lovely and engaging, should nevertheless, have been pursued upon such perverse principles, and with such misguided views, as to lead to consequences equally false in their own nature, and ruinous to the welfare of any society where they may become universally prevalent.

I HAVE been accidentally led to make a few reflections on this subject, by the perusal of some foreign writers on natural history, who have unfortunately applied the proofs of those inexplicable changes, which may possibly have taken place in the earth, and indeed all their negative knowledge of nature, for the purpose of disproving the existence of its admirable author; as if arguments, derived from the depths of human ignorance, could with any reason, be esteemed capable of overturning such positive truths as the faculties of mankind are entirely adequate to apprehend.

WHEN

WHEN men chuse to build their opinions on things which they do not rightly understand, rather than on truths which come clearly within their comprehension, it can hardly happen that they will not run into very gross mistakes; because, as the number of errors on any subject is plainly without limits, the chance is little less than infinite, that such reasoners will fall into the unfathomable abyfs of falsehood.

SUCH has been the fate of the author of a French work, *Sur la Nature*, and indeed of every follower of that pernicious school of modern philosophy, which, rejecting all consideration of final causes, and despising those simple and obvious analogies that lead to the most useful and satisfactory truths, has chosen rather to pursue others, which neither its disciples, nor the rest of mankind, are in any respect suited to investigate*.

PERHAPS

* "Il est au dessous de Dieu d'agir pour une fin."—*Vide Des Cartes Philosoph.*—*Maupertuis Essai de la Cosmologie.*—*Buffon Theorie de la Terre.*—*Robinet Sur la Nature, &c. &c.*

PERHAPS an example may serve to render me more intelligible, and to point out the general fallacy of this unhappy species of reasoning.

THERE can be no doubt, that the telescope, with all its present improvements, is the result of a most happy application of uncommon skill and ingenuity, contriving and combining all the various parts and movements of that curious machine, for the excellent purpose of assisting vision.

IN proportion as these improvements were gradually invented, and applied to use, during a long series of years ; when each successive discovery was brought to the utmost extent of its perfection, mankind then observed that the human eye, in a very superior manner enjoyed that particular advantage, which they had sought after with so much art and industry, exhibiting to view a perfect achromatic instrument of vision, adapting itself with
surprizing

COAST OF ANTRIM. 167

surprizing facility to the different brightness of its objects, and to a vast variety of distances.

AT the last, a defect was discovered in telescopes, arising from the spherical figure of the glasses; in consequence of which, the focus of those rays which fall toward the limb of the glass, and of such as pass near to its center, do not coincide. This defect, after various fruitless attempts to obviate it, has for many years been given up by the most ingenious artists, as irremediable*. But though men have, in this instance found, that there are bounds placed to their utmost

U skill

* The most probable means discovered, of late years, for correcting these spherical errors, have been offered to the public by that excellent British artist, Mr. Ramsden, who conceives them capable of being in great measure removed in the *eye-glasses* of telescopes, (where they are most sensibly felt) by such an adjustment of the instrument, as that the image formed by the object-glass, shall fall as near as possible to the eye-glass.—See *Philosophical Transactions of the Royal Society of London*, A. D. 1782.

skill and ingenuity, yet have they learned this useful truth, that there are no discoverable limits set to the powers of that admirable cause which formed the human eye; this error being there entirely corrected, in the curious construction of the crystalline humour, the principal refracting lens of the organ of vision; which, gradually encreasing in density from the limb toward the middle, does by this wonderful variation of its refractive power in one respect, counteract the errors which would have arisen from the other consideration.

THIS happy union of different parts and movements, as well in the natural, as in the artificial machine, each attaining its own particular end, and all together, without confusion or interference, compleating *one greater and more excellent effect*,—this, I say, reasonable men denominate a work of design; and as they affirm, that the telescope is an instrument formed to assist vision, in consequence

quence of various *means*, duly connected, by an invisible cause; (for it is plain that there is some moving principle in man, which is neither eyes, ears, hands, or head, neither the *tout ensemble* of all these, nor in any respect the object of our senses :) so do they believe, that the human eye is an instrument made for the use of man, by an exceeding apt combination of intermediate causes, wonderfully and most unaccountably connected together by one, great, wise, and good cause; who is neither the eye itself, nor any part of its mechanism, nor at all the object of our senses; but only visible to us through the beauty and wisdom of the works of creation, in the same manner as thought and intelligence in man are known to us, through those motions and effects daily produced before us, which we do always suppose to result, originally, from a principle in some sort resembling our own minds.

FROM hence, and a thousand other similar analogies, for apprehending which our facul-

ties are admirably adapted, mankind have reasonably inferred the existence of *one, superior, intelligent, good* being; who is every where present; whom we see, and feel, and hear, every moment of our lives, in the visible works of nature, as we do in particular circumstances hear, and feel, and see, other beings whom we denominate men.

To this reasoning, which does not in any respect appear uncandid or delusive, the author of the treatise, *Sur la Nature*, warmly objects.—What! the eyes made for vision, which in many instances fail and become blind?—The teeth and jaws made to grind food, which so often loosen, and refuse to perform their office?—The earth formed to support its inhabitants, whilst it contains volcanos which may have destroyed them by fire? Or an ocean, which has overwhelmed them under its waters?

THESE are some of the objections of that extraordinary writer, and this the general mode

mode of argument, unhappily adopted on the continent, by too many of those who have obtained the honourable title of philosophers : A false species of reasoning, in which, the positive parts of human knowledge are most sophistically supplanted by what is purely negative—In which, a man is required to judge of the truth of what he knows, by those other parts of nature of which he is avowedly ignorant.

From principles such as these, this beautiful world, so aptly formed, so wisely moved, so bountifully, and yet so variously adapted to maintain its different inhabitants, that the native of every country from the equator to the poles, finds cause to bless his situation, and to boast of comforts unknown in other climates ; this curious structure, the delight and wonder of the best and wisest men in every age, has been condemned by a few presumptuous sophists, as the work of blind destiny, acting through the present elements of nature ; because there are many of its principles

principles and movements, of whose use they are ignorant;—because there appear to be vestiges of the ravages of fire, or the inundations of the ocean, which they are not able to explain.

IT is most certain, that the laws of motion which now exist, could not have produced this world in the beginning; neither are they capable of continuing it for ever in its present state.

THE interior structure of the earth, whereby its various fossil substances, though differing exceedingly from each other in specific gravity, though not arranged according to any regular law of situation, do yet constitute a world self-balanced, a sphere whose center of gravity coincides with its center of magnitude, (without which all its motions must have been in an extreme degree irregular) evidently demands a first cause, which neither acts blindly, nor of necessity.—A blind principle is not wont to labour in defiance
of

of all chance ; neither do mechanical causes usually produce their effects, in contempt of the established laws of matter and motion.

THE gradual ascent of our continents from the shores of the ocean, toward their mediterranean parts, so necessary for collecting the rains of Heaven, and giving birth and course to those rivers which beautify and fertilize the earth ; this exterior form, without which, the vapours of the sea would have ascended to the clouds in vain, plainly requires the interference of some principle superior to any of the known elements of nature. Whatever the followers of Epicurus may think of these mighty elements, no reasonable man will ever believe, that the waves of the ocean could have created a country, whose soil lies far above the level of its waters ; or that the fury of volcanic eruptions have produced an effect, so general, that we are rather led to infer the casual existence of former volcanos, in particular

cular places, because of some apparent interruption to this universal regularity of form.

THE projectile force by which the earth was in the beginning made to move round the center of light and heat;—its diurnal rotation, duly diffusing this light and heat over its surface;—the inclination of its axis to the plane of the ecliptic, whereby the tropical climates receive fewer of the sun's rays, while the inhabitant of the polar circle enjoys a larger share*: All these effects, far surpassing the present powers of nature, most aptly combined together, working in concert, without interference or disorder, for the attainment of *one, great, and good, and excellent* end, clearly prove that this world has been produced by *one, powerful, intelligent, and benevolent* principle, utterly unlike to any mechanical cause which does now exist, or that can be conceived to exist.

MECHANICAL

* Vide Keil's *Phyf. Effays*.

MECHANICAL causes, such as we are acquainted with, evidently tend to destroy the present form of the world; and thereby afford the strongest proof that it is not by its constitution immortal.

SIR Isaac Newton has demonstrated, that the perturbing forces which take place in the solar system, must in due time destroy the planetary motions, unless the first mover of all things shall chuse to interfere. And it is sufficiently evident, that the slow but certain operations of heat and cold, together with the continued action of the air and storms, are capable of breaking and changing the most firm bodies, even the hardest rocks; while the numerous rivers on the earth's surface, and the waves that wash its shores, perpetually labour to bear all these substances into the bottom of the ocean, and thereby to reduce all things to a level situation.

SINCE then, the earth yet continues to circulate with regularity round the sun, notwithstanding

withstanding the perturbing forces of the planets;—since all the countries on its surface still retain their elevated form, in opposition to those boasted mechanical causes, that labour incessantly to destroy it;—since its impetuous rivers which pursue their course toward the ocean, have not yet even smoothed those abrupt and precipitous cataracts, over which they rush with such unbridled fury, it is plain, either that the world, as we now see it, is but of a short duration; or else, that some saving hand has interfered, to retard the progress of causes which, in sufficient length of time, must needs produce their effects.

FROM the same fatal and deceitful source of reasoning, the Christian religion, whose *genuine* precepts and doctrines have sustained an ordeal inquisition of ages, against which, no system built upon false principles could have maintained itself, even for a moment; this excellent dispensation, breathing forth glory to God, and peace and good-will amongst men, was hastily rejected, because the
population

population of America, and the casual properties of the natives of that country, could not be accounted for by men who had no other data whereon to reason, except the imaginary extent of their own genius, together with an entire ignorance of the situation of that continent, and the nature of its inhabitants *.

EVEN

* The proximity of America to the continent of Asia, is now perfectly ascertained by the British navigators, although the distance between these countries was stated by theorists, as amounting to an impassable gulf of some thousand miles.—The confident assertion of modern philosophers, that its inhabitants were beardless, is from many quarters proved to be false. (*See Carver's account of North America, Cook's voyages, Marsden's Sumatra, &c. &c.*) And there is every reason for believing that their copper colour, and other peculiarities, are altogether the effect of climate, since in exposed situations, the progeny of the Europeans has been found to suffer considerable alterations in these circumstances, during the course of those few generations which have passed since their first establishment on that continent. In these instances, therefore, revealed religion, so far from apprehending danger by the discovery of truth, and the improvement of human knowledge, has only suffered from the ignorance or misinformation of philosophers.

EVEN at this day, when these erroneous opinions have been effectually corrected by the advancement of human knowledge; the truth of this amiable religion is again triumphantly called in question by modern sophists, because the creation of the world, and its various productions, as related in the Jewish writings, do not accord precisely with the vague and defultory system of every idle theorist; because this stupendous work of omnipotence cannot instantly be explained by principles, crudely deduced from the transient and contracted analogies of a few speculative philosophers.

IN truth, the elevated genius of Longinus, that illustrious critic of Greece, had not a juster cause for admiration, at the noble and sublime description of creation, as recorded in the Jewish writings; than rational philosophy may have, at this day, in tracing its accurate coincidence with such few facts, as have come within the limited reach of human observation,

observation, on this admirable but incomprehensible subject.

IN these ancient writings we are informed, that, at a period indefinitely remote from the present age, the supreme cause of all things created the principles of this vast universe; and by his omnipotent will called forth light from darkness. The ambient air, its clouds and vapours, were next in order separated from the formless mass of elements; and the *firmament of heaven* proclaimed the second period of creation.—The sea and land became divided; mountains, hills, vallies, plains and rivers appeared; and the varied *vegetable tribes* of earth and ocean began their period of existence, adding beauty to the third work of the omnipotent spirit.—Next were formed the *luminaries of heaven*, alternate rulers of day and night, dividing the uniform course of duration into days, and seasons, and years.—The numerous *inhabitants of air*, chaunted the fourth period of creation; and the inexhaustible

haustible *shoals of the ocean*, partaking in the blessings of existence, multiplied exceedingly through the world.—Next, at their maker's supreme command, came forth the various tribes of *terrestrial animals*; reptiles, and cattle, and beasts of the field; covering the face of earth, with new and delightful varieties of life and beauty.—And finally, at a time but little distant from the present age, God formed man, intelligent like his maker, the chief work of this beautiful fabrick, a moral agent, capable of distinguishing good from evil, and accountable for his actions to that supreme spirit who created him.

SUCH is the rational, but exalted history of creation, as related in the Mosaic writings; wherein sublimity and simplicity of language, philosophical accuracy and the most intelligible brevity, are so exquisitely combined together, as renders it impossible to determine which of these circumstances is most worthy of our admiration.

THE

THE disciples of Epicurus, and the less consistent theorists of the present age, have never yet proved, neither will they ever be able to shew, that mechanical causes now existing, or any fortuitous combinations of them, or of others, that can be imagined to exist, are at all competent to add, even a new individual, to the numerous tribes of land and aquatic vegetables; much less, to the fowls of heaven, or the fishes of the ocean; to the reptiles or quadrupeds of earth; and least of all to man, the humble image of that intelligent cause who has condescended to manifest in his stupendous works, a few of those attributes which, in variety and extent, can never be apprehended by any created being whatsoever. So that the interference of some omnipotent principle, utterly unlike to any known or conceivable mechanical cause, must formerly have taken place, even on the abstract reasonings of these very philosophers themselves.

IN

IN this entire account of creation, as related in the Mosaic history, there is but one period which is in its nature definite : namely, that of the formation of man, the final work of God ; whose generations, as recorded in these venerable writings, enable us to trace backward the existence of his species through an interval of a few thousand years. Antecedent to this event, the successive operations of the omnipotent spirit, do not appear to be limited by any determinable portion of duration ; but in their regular order of succession, are most beautifully, and intelligibly, compared to the daily works of men, even before the sun arose in the east, to pursue his glorious course.

HERE then is an expanse of past duration, which affords ample range for the imagination of the most daring philosopher ; an abyss wherein presumption and vanity will easily be overwhelmed ; whilst the timid dove, diffident of her native strength, and frequently revisiting, with wearied wing, the friendly
 asylum

asylum from whence she took her flight, may hope at length to find rest for the sole of her foot.

IN this perilous ocean, genuine philosophy sometimes launches forth successfully ; and by comparing attentively its limited and imperfect analogies, by reasoning with modest patience, and often revisiting the shore of time so clearly defined by revelation, it investigates with advantage, discovers resting places amid the vast abyss, and in many instances, is able to confirm the extraordinary truths that are contained in the Jewish history of creation.

THE ocean has indeed left evident, and indisputable traces, of its permanent residence, in places, from whence it could not have been removed by any of the mechanical causes that now exist.—Countries, at this day tranquil and temperate, the seat of human industry and arts, seem to exhibit traces of the wild and unrestrained fury of the element of fire.—Vegetable productions, and marine animals, appear to have

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been

been multiplied prodigiously on the face of the earth, at a distant period of time; and have left heaps of their exuviae in situations and circumstances, totally inexplicable to the wisest philosopher.—Quadrupeds, and the other brute inhabitants of the firm land, bear the character of a later existence; little, if any, of their remains, being found amongst extraneous fossil productions, in such circumstances as demand a remote existence.—But of the human species, there has not been discovered a single unequivocal instance of an ancient date, amidst all the immense vestiges of vegetable and animal life, so extensively dispersed over the face of the whole earth*.

HENCE

* It may, with the strictest truth, be affirmed, that, no unequivocal instance of *ancient* human exuviae, has ever occurred to me as an individual, in consequence of attentive personal observation in Ireland, in Great Britain, and on the continent. But negative assertions should always be made with diffidence and caution; and particularly in the present case, where the contrary opinion has

HENCE it is plain, that so far as philosophy calmly reasons upon facts, without following

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has been confidently maintained by many persons; for which reason a general conclusion of this sort ought not to be admitted, without a very extensive and well-founded induction from negative examples.

In addition, therefore, to personal observation, I have made it my business to enquire from men in different countries, who should be the most competent to give information, and have examined several of the very cabinets wherein these exuviae are supposed to be deposited, without a single positive instance having ever occurred, or been fairly attested; so that the negative examples are here extremely copious, and derived from the very best sources; whilst the positive assertions that have been made on this subject are exceedingly few in number, and have come from persons little competent to decide on questions of this sort.

But the opinion of Doctor Camper, whose minute enquiries, and excellent anatomical knowledge, renders his testimony of a very superior kind, gives the strongest confirmation to this opinion. "I think," (says that author) "it is a circumstance worthy the attention of the curious, that no *human bones* have been hitherto found, in a petrified state, and belonging to the ancient world."—*See conjectures relating to petrifications in St. Peter's mountain, near Mæstricht, by Petrus Camper, M. D. Phil. Transf. London.*

lowing the crude suggestions of a delusive fantasy, it bears the fairest and most honourable testimony in defence of revealed, as well as of natural religion.

IF we cast our eyes over the annals of the world, we shall find in the history of the human race, a clear and decisive evidence in favour of those general truths which our religion teaches, concerning the duration of the earth and its inhabitants. The evident marks of novelty in all those arts and sciences that are the offspring of experience: The wonder and terror with which the earlier philosophers (though in other respects well-informed men,) were wont to behold many of those natural appearances, which longer observation has shewn to be neither uncommon nor dangerous: The general defect of all histories and traditions, antecedent to a certain period, at which the Jewish writings affirm the world to have been destroyed by water: These cogent circumstances afford the plainest proof, that

that the human race has not existed here for many ages.

THERE is not now a nation on the earth, neither has there been one for these two thousand years past, whose most remote traditions extend, with any degree of probability, beyond that memorable period of the universal deluge, which is recorded in the sacred writings; so that whatever Mr. Voltaire, and others, may assert, concerning the eternity of the world, its motions, or its inhabitants, they will find but few rational men to adopt his wild system of astronomy, or who can be persuaded to believe that the sun ever rose in the west, or that the Babylonians made observations on that luminary some millions of years ago, when it was at the north pole *.

PERHAPS

* Mr. Voltaire, and after him the Abbe Reynall, believes that the earth has an unknown motion round one of its equatorial diameters, in such sort, that its axis performs an entire revolution in the space of four millions

PERHAPS you will say, that such language as this is silly and childish, beneath the name of philosophical, and unworthy of any answer—yet I can assure you it is the general language of that miserable school of modern philosophy, which searches for the most unknown motions, to explain those that are best known;—which breaks fragments from the sun by chance, and then mysteriously forms them into habitable worlds ;
which

millions of years. Voltaire's proofs of this motion are founded on an observation of the obliquity of the equator and ecliptic, said to have been made by Pythias about two thousand years ago ; on the general accounts to be met with in Ovid's *Metamorphoses*, of strange revolutions having formerly taken place on the earth's surface ; and on a wild fable of the Egyptians, affirming that the sun rose twice in the west within the memory of their nation.—Nay, this extraordinary philosopher seems to imagine it not very improbable, that the poles themselves may travel over different parts of the earth's surface ; and it seems but a slight objection to this belief, that the oldest monuments in the world, the pyramids of Egypt, are accurately situated to face the cardinal points of the compass, the stability of which cardinal points entirely depends on the continuance of the poles of the earth in the same precise spot of the surface.

which makes the ocean to act where it is not * ;—which quotes the fables of Ovid, or the tales of the Egyptians, as its best authority in natural history † ;—which utterly rejects the delightful and profitable pursuit of final causes ‡ ;—and holds the most precious moments of life to be well employed in endeavours to discover the thoughts and amusements of trees and stones ||.

IF this be wisdom, we, my friend, have reason to boast that we are not wise: If these be the vaunted fruits of freedom of thought, we have good cause indeed to rejoice that we are not free; that we still retain a sense of our dependance on a wise and bountiful Providence; and have not yet fallen into that universal anarchy of opinion, where
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* See Buffon *Theorie de la Terre*.

† See Voltaire's *Period of 4,000,000 Years*.

‡ See Des Cartes, Maupertuis, &c.

|| See Robinet *sur la Nature*.

each individual labours to enthrone, and to adore, every wild phantom of his own wandering imagination, just as folly or caprice may chance to direct his choice.



F I N I S.

